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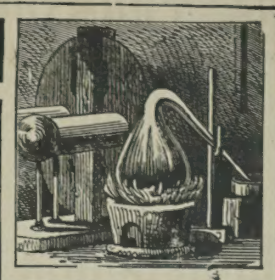
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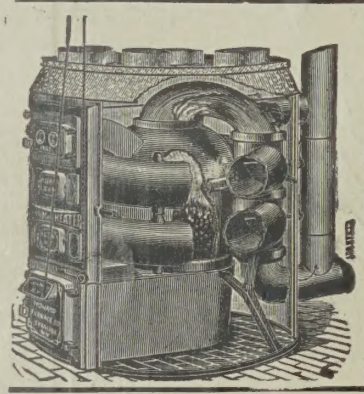
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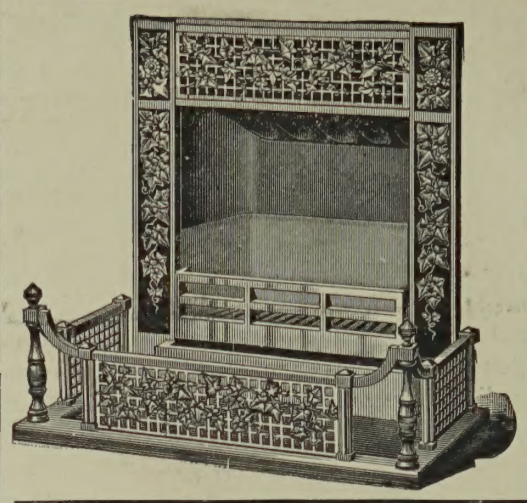
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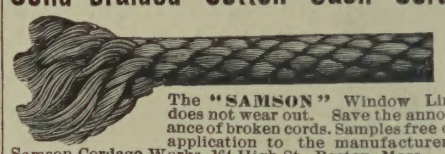
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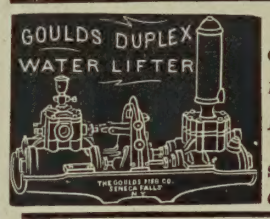


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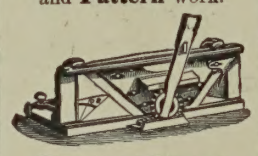
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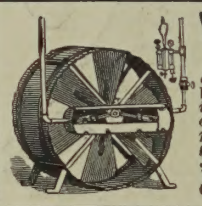
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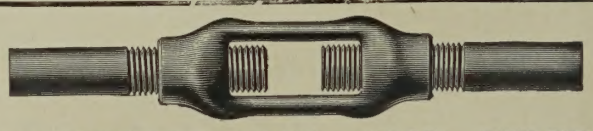
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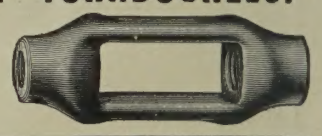
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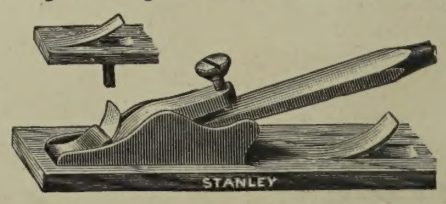
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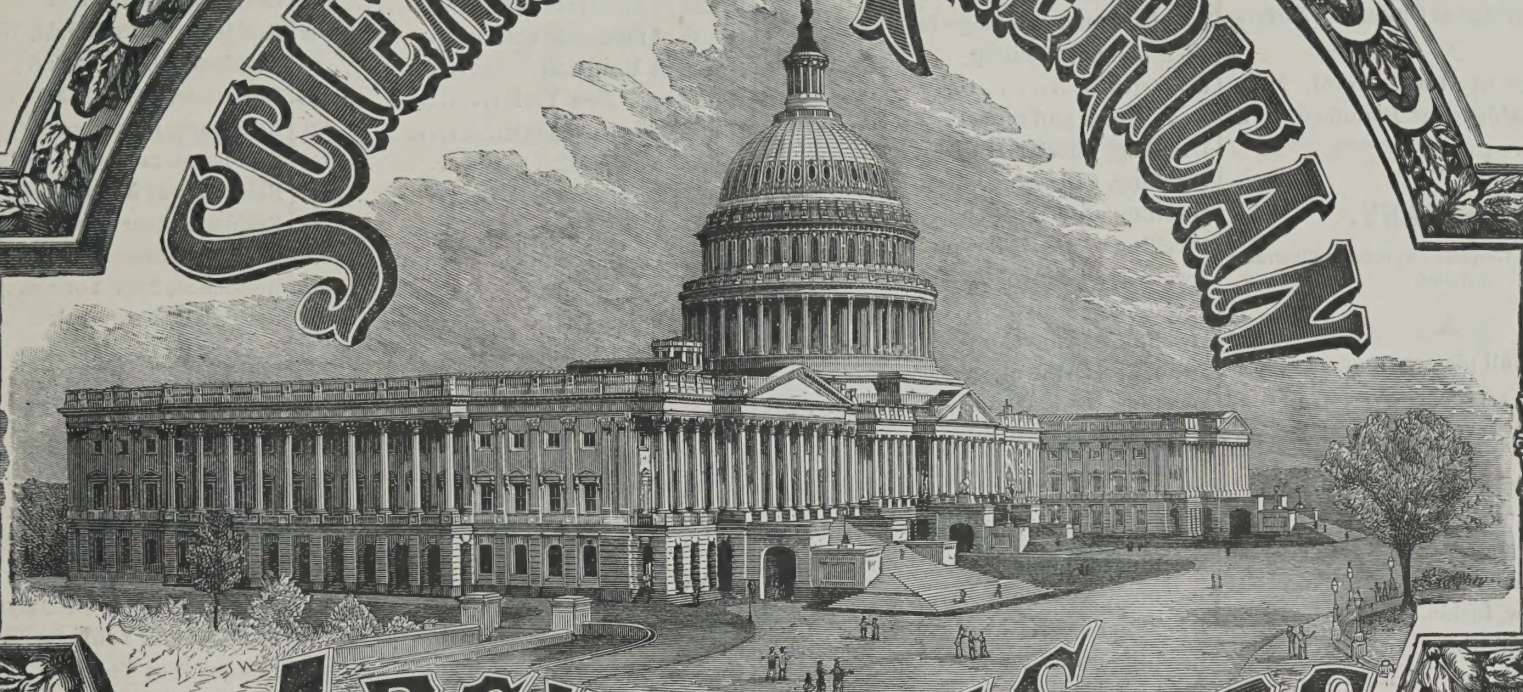
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A RESIDENCE AT MONTCLAIR.—[See pages 7 and 8.]

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RESIDENCE OF HENRY R. TOWNE, ESQ., STAMFORD, CONN.

One of our colored plates this month illustrates the residence erected for Mr. Henry R. Towne, at Stamford, Connecticut. H. Hudson Holly, of New York, architect. Dimensions: Front, 51 ft. 10 in.; side, 70 ft. 8 in., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. First story, partly of brick, pointed in black mortar, with trimmings of stone and buff brick; the rest of the building is of wood covered with clapboarding and shingles, painted light olive green, with bottle green trimmings. Roof, slated. The main entrance is at side, with stone steps and tiled platforms; the walls to this entrance way are laid up with tiles and buff brick. Hall, trimmed with oak, contains a grand staircase, with carved newel and candelabra; the windows on landing glazed with stained glass. This hall, also, has a panel wainscoting and ceiling beams. The floors throughout are of ash and cherry, laid in narrow widths, etc. The drawing room is trimmed with mahogany, the library and den with cherry, and the dining room with ash. The open fireplaces are furnished with tiled and marble hearths, and hardwood mantels elegantly carved. Butler's pantry, rear hall, and kitchen, and other apartments are trimmed with hard Southern pine, finished natural. Cellar contains the kitchen, laundry, furnace room, and other apartments, all fitted up complete. Lift runs to attic. Second floor contains six bed rooms, with ample closets and two bath rooms. These rooms, as well as third floor, are trimmed with whitewood finished natural. There are five bed rooms, billiard room, and trunk room in attic or third floor. This house is wired for electric illumination, and is also provided with electric bells and speaking tubes, etc. Cost, $20,000. Our plate was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN. For sheet of details see page 10.

A DWELLING AT TREMONT, NEW YORK.

One of our colored plates this month illustrates a dwelling erected for Mr. T. Roehrs, Tremont, N. Y. Architect, Mr. Pickering, New York. Dimensions: Front 24 ft. 6 in.; side 40 ft. 6 in., not including piazza. Height of first story 9 ft.; second 8 ft. 6 in. Underpinning and all stone work is built of Tuckahoe marble pointed in red mortar. Exterior clapboarded, painted light olive green, with dark green trimmings, all shingle work painted tile red. Roof slated. The rooms are arranged conveniently. The trim of white pine is stained and finished in cherry. Hall contains an ornamental staircase, with newel, balusters, and rail turned, of ash. Sliding doors connect parlor and dining room. Fireplaces have tiled hearths and hardwood mantels. Kitchen and pantries are trimmed and wainscoted with Georgia pine, finished natural. These apartments are fitted up complete. Second floor contains three bed rooms, den, and bath room, the latter fitted up in the best manner. Two rooms and trunk room in attic. Cemented cellar, contains laundry. Heated by steam. Ceilings corniced. Cost $6,000. For sheet of details see page 14. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

Steam and Hot Water Heating.

In discussing the merits and economies of methods of heating, householders should bear in mind, as sometimes they do not, the differences in the amount of space warmed and the quantity and diffusion of heat required. For instance, a citizen related recently how his stove, which he had substituted for a small furnace, had saved him several tons of coal in a season. It appeared, however, on inquiry, that he had to shut up several rooms in cold weather which were formerly warmed by the furnace, so that with less coal he got less heat. It is cheaper, of course, to warm few rooms than many, small rooms than large ones, a little house than a big one; but in the case of steam and hot water heating, the proportionate expense of running the heat decreases as the amount of space to be heated increases—that is, it does not cost twice as much to warm a house of sixteen rooms as to warm one of eight rooms.

It has been sufficiently well established by experience that the running cost of a steam or of a hot water plant, where the heating is done by the *direct* plan (that is, with radiators inside the rooms to be warmed), is much cheaper than that of a furnace in the same house heating the same rooms. It may safely be put at 15 per cent. less, and in favorable conditions even a larger saving could be made. With *indirect* steam heating, where the steam is used to heat chambers of air in the cellar, supplied from the cold air outside and conducted, after warming, by flues and through registers, after the plan of the hot-air furnace, there is very little, if any, saving of expense. Some people prefer this method, because they dislike radiators; but it should always be remembered that the direct method is the cheaper. Steam heating by either method has manifest advantages over furnace heating, especially in the entire absence of dust, the plague of a furnace-heated house, which the best made apparatus cannot keep from the rooms. A steam plant is more durable than a furnace and requires little care, the important points being to keep the grate clear and the boiler clean. Keeping the grate clear is important in all fires, as fuel is wasted where the under draught is choked. Steam heating apparatus is supplied with automatic dampers, which regulate the draught. The cost of a plant is not so great proportionately for a large house as for a small one. One adapted to heating 15,000 cubic feet, which is about the amount of space in an average-sized eight room house, will cost, all complete, from $375 to $425.

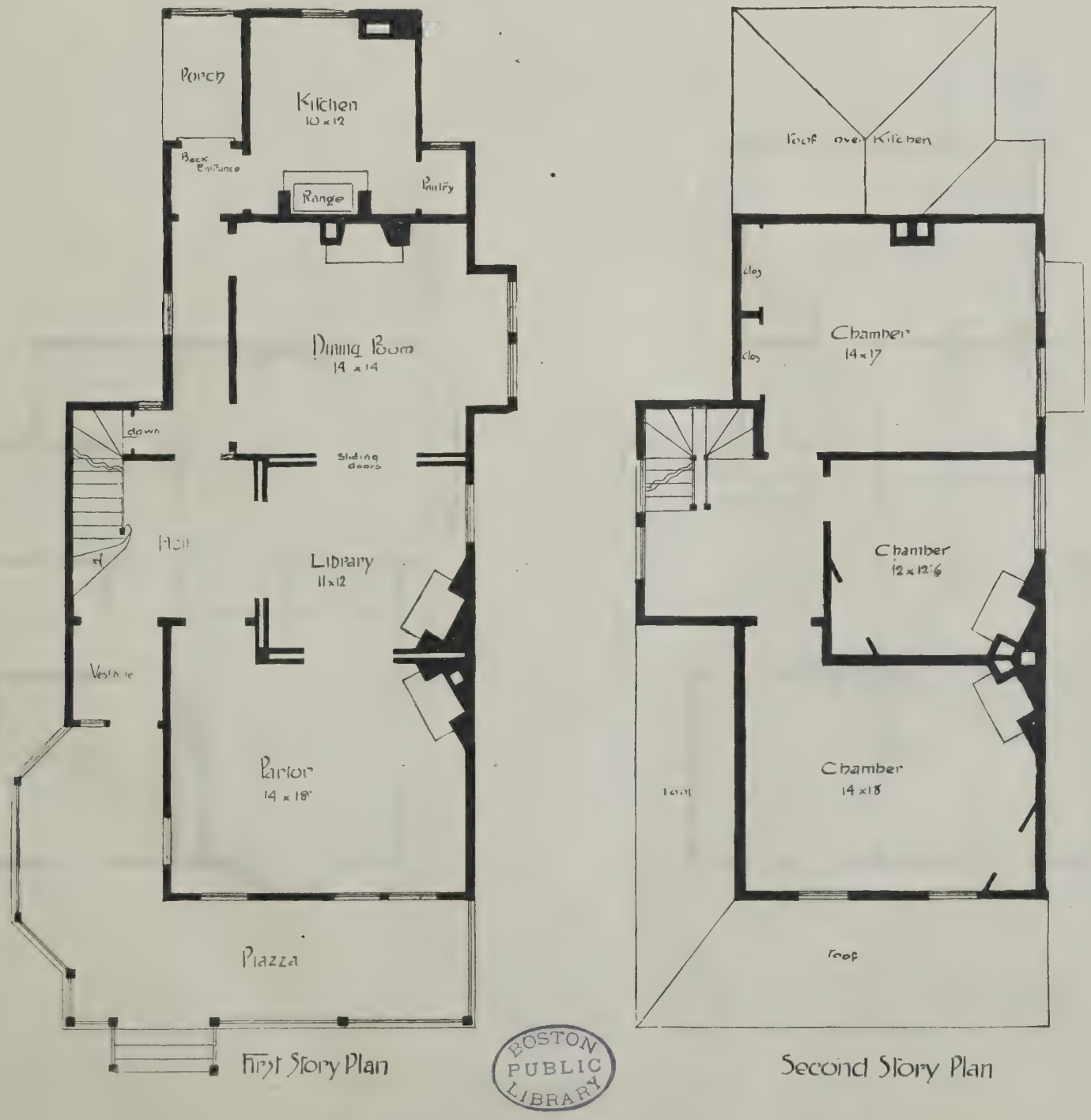
A hot water plant costs about 10 per cent. more than a steam plant for the same space to be warmed. The running cost the season through is less than with steam, though during very severe weather the consumption of fuel will be somewhat greater. This is more than offset by the much less expense during the milder periods, when the fire in a hot water boiler can be run very low. There is about the same difference between the cost of direct and indirect heating as with steam. In indirect heating, the hot air flows through the room and passes off, it being necessary to provide for its escape in order to keep up the flow of cold air into the heating chambers. But in direct heating, the air of the room is warmed over and over, and a less degree of heat in the radiator is needed to keep up the temperature of the room. In steam heating, whatever the weather, the fire in the boiler must always be kept up hot enough to make steam, otherwise there will be no heat. In a hot water plant the circulation of the water in the pipes can be maintained with a fire that would not make steam. This is the principal reason why hot water is cheaper than steam. Another advantage is that in starting a new fire in a hot water plant, the water begins to circulate in the pipes the moment the fire begins to raise its temperature, and very soon gives off heat; whereas in a steam boiler no heat can be had till the fire has burned long enough to raise all the water in the boiler to the steam point.

It is probable that 50 per cent. of the people who build houses nowadays put in steam or hot water plants for heating, and their greater economy and vastly greater convenience and desirability over other methods are coming to be generally conceded and understood. There has been a large decrease of cost in these kinds of heating apparatus within eighteen or twenty years, as well as very important improvements in the efficiency and economy of the apparatus. Most patents have expired, so that there is very little monopoly in any part of their manufacture, and competition has reduced the cost to customers to about its lowest terms. As some people cherish the notion that there is danger in a hot water plant, it should be said here that it is absolutely the safest system of heating known; there is no possibility of an explosion, as the expansion of the water is provided for by an open vent, so that there is never any pressure on the pipes. We commend these systems as on all accounts the best and cheapest, and believe that every one who tries them will indorse that view.—*Chauncey R. Sias, in Good Housekeeping.*

The Garden.

In the June number of the *North American Review* Ouida writes entertainingly about gardens, taking for her text a passage in which Lord Lytton reminds us that whoever has a garden has one chamber roofed by heaven in which the poet and philosopher can feel at home. The seclusion and home-likeness which distinguish every real private garden from a public park are dwelt upon as its essential charm. It follows naturally that a place dedicated to retirement and reflection should be simple and natural, and this gives the author an argument against artificiality of construction, elaborateness of decoration and over much sweeping and pruning, and it justifies a plea for old fashioned flowers, about which hang memories of a happy childhood. And here is a passage which we cannot forbear to quote: "Of all emotions which give the nature capable of it the purest and longest-lived pleasure, the sense of the beauty of natural things is the one which costs least pain in its indulgence, and most refines and elevates the character. The garden, the meadow, the wood, the orchard, are the schools in which this appreciative faculty is cultured most easily and enjoyably. Dostoievsky may find food for it on the desolate steppe, and Burns in the dreary plowed furrow; but to do this, genius must exist in the man who feels: it is to the ordinary sensibilities, the medium mind, the character which is malleable, but in no way unusual, that this training of the eye and of the heart is necessary; and for this training there is no school so happy and so useful as a garden. All children, or nearly all, take instinctive delight in gardens; it is very easy to make this delight not merely an instinctive, but an intelligent one; very easy to make the arrival of the first crocus, the observation of the wren's nest in the ivy hedge, of the perennial wonders of frost and of sunshine, of the death and the resurrection of nature, of the deepest interest to a young mind athirst for marvels."

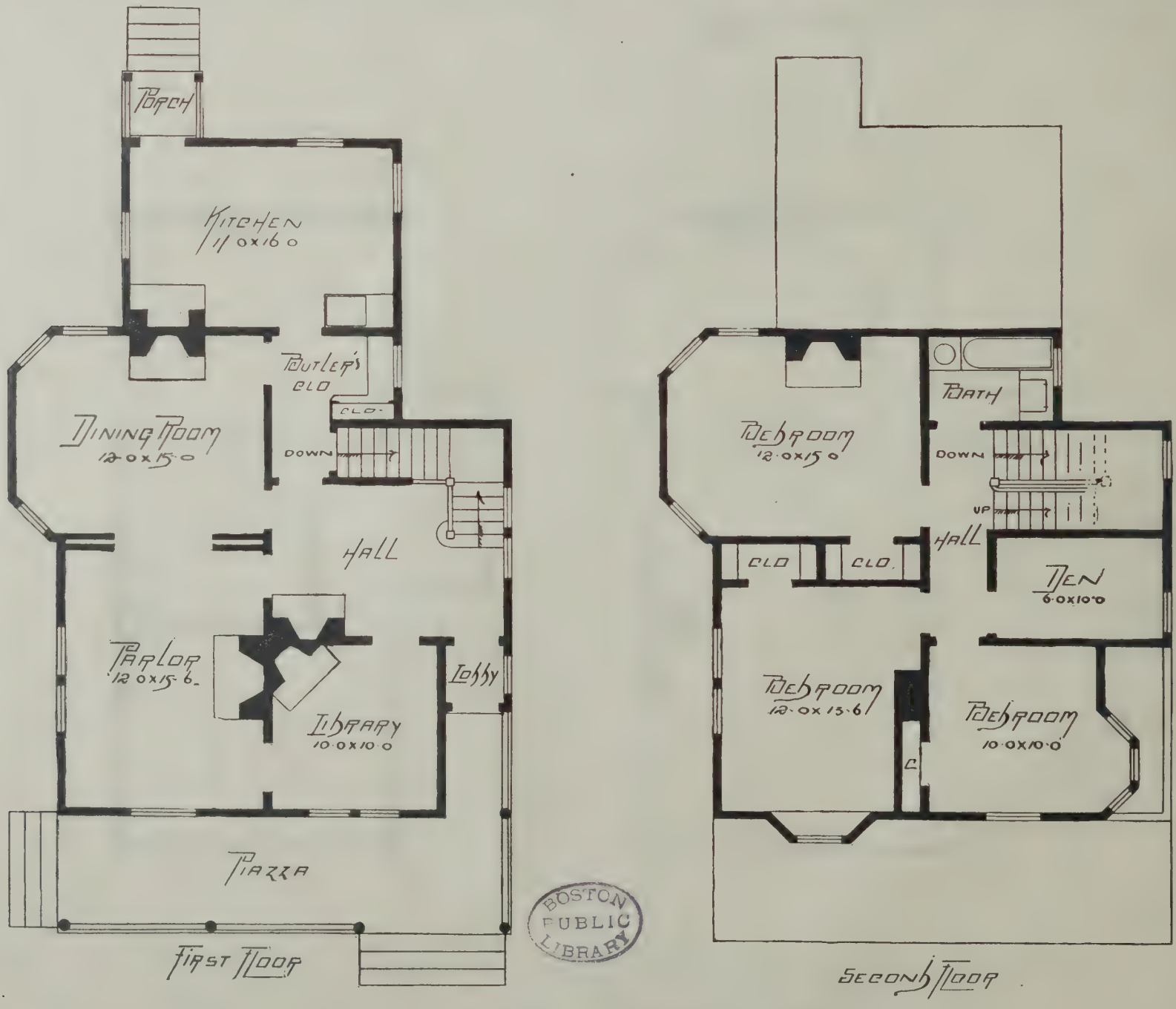




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A RESIDENCE AT WEST BROOKLYN. [See page 7.]

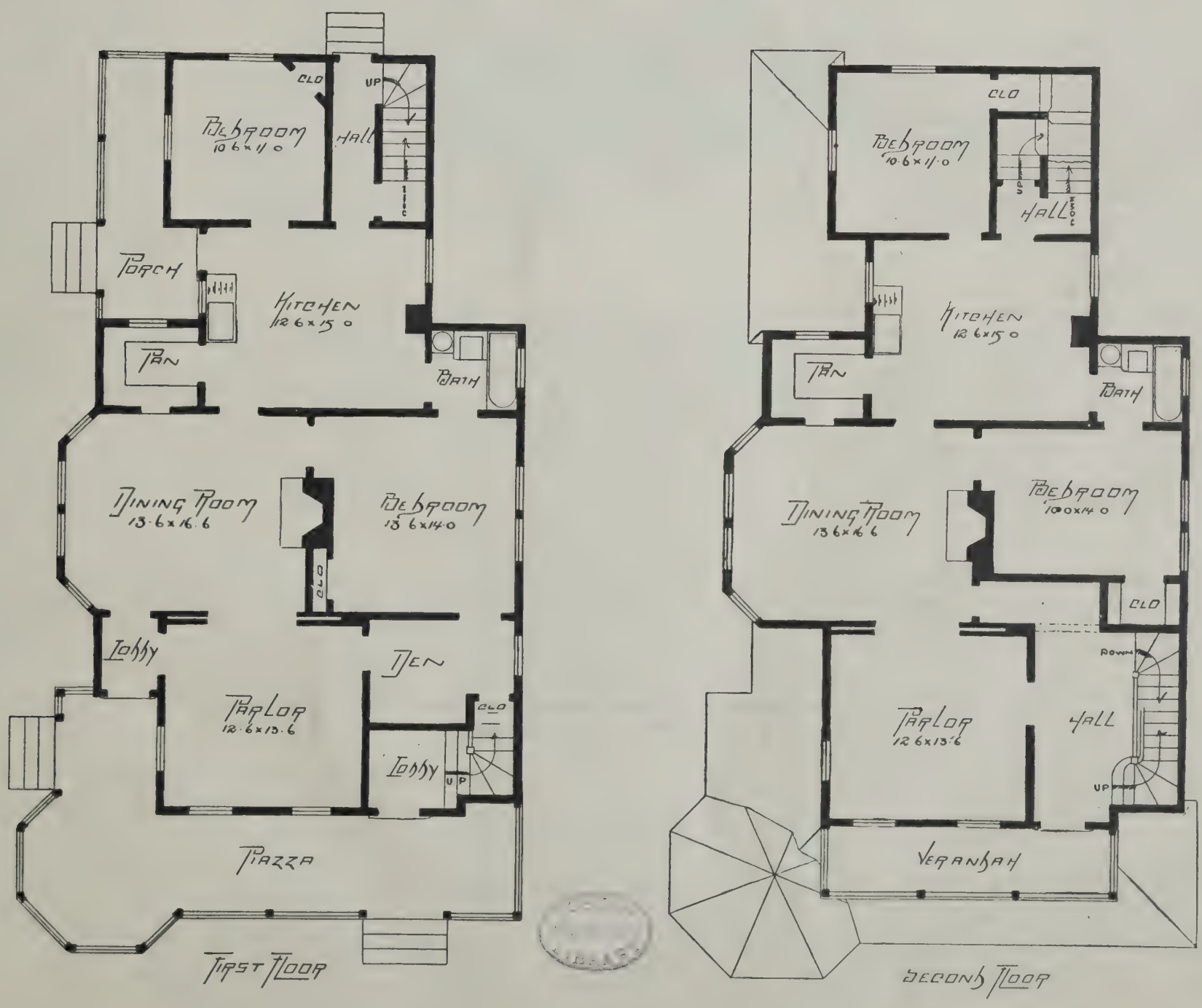




BOSTON PUBLIC LIBRARY

A COTTAGE AT DUNWOODIE. [See page 7.]





A DWELLING AT HOLYOKE. [See page 7.]

RESIDENCE AT SURBITON, SURREY.

This house is now in course of erection within ten minutes' walk of Surbiton Station. It is built of red bricks, with Broseley tile roof, the upper floor being finished rough cast. The exterior woodwork is principally of teak, merely oiled, while shutters are appended to the bedroom windows in front, which face due south. There are eight bedrooms, bathroom, housemaids' and linen closets, etc., on the upper floors, and the trimmings of staircase and best rooms are being executed from special designs prepared by the architect, Mr. J. Nixon Horsfield, Market Place, Kingston-on-Thames.—*Building News.*

European Health Resorts.

At the recent meeting in Paris of the International Congress on Climatology and Hydrology, Mr. Adolphe Smith opened a discussion on the necessity of improved sanitation at various health and winter resorts. He trusted the congress would not misunderstand the object he had in view; his interests were not connected with those of any locality or nationality. This was an international congress; its sole object was to guide, in a scientific manner, those who suffered so that they might soon be cured; and this must be done on purely scientific grounds, without stopping to consider for a moment the interests of any particular district. He was willing to assent to the asserted inferiority of the English climate; but unfortunately a great number of English patients would not repair to the Continent, because they feared to encounter the bad sanitation, especially of the French, Spanish, and Italian so-called health resorts. It was only necessary to compare the death rates to show the appalling difference that existed.

In England, at seaside and health resorts, and in spite of the presence of numerous patients, there were death rates of 12, 13, and 14 per 1,000. A small town in a healthy position, where there were no factories, no accumulations of poor people, but for the most part lodging house keepers and people fairly well off, should have a death rate below 15 per 1,000 per annum. But he had found in France and elsewhere that the death rate in such places amounted to 22 and in one case to 28 per 1,000. This was all the more remarkable as there were fewer children in France. With the same proportion of children as in England, the mortality in France would be still higher. The reason for this distressful state of affairs was not far to seek. Even today new houses were in course of construction with cesspools placed under the front sitting room, so that they could be easily emptied from the street. The closets were constructed with soil pipes so large that it was impossible to cleanse them; there were no traps, and practically nothing to prevent cesspool gases entering the house. In the kitchens the leaden pipes went straight to the sewers, without trap and interception. The houses were simultaneously permeated with sewer air and the emanations from the cesspool. The patient while he was out of doors enjoyed a much better climate than in England. But what was the good of a pleasant walk in the sun for three or four hours if, during the remaining twenty hours, the patient was condemned to breathe sewer air? He could understand that municipalities should hesitate to build large sewers and adopt vast expensive schemes of drainage; but domestic drainage could be very much better managed, and at little or no expense.

In England, in some health resorts, it was proposed to examine lodging houses and hotels, and give diplomas as to their sanitary condition, so that visitors might have the option of selecting for residence only such places as were certified to be in a healthy condition. The *Lancet* had taken an active and successful part in this campaign, and it served to arouse public opinion. Could not something similar be done on the Continent? Then there was nothing to prevent the letting of rooms where there had been cases of small pox or scarlet fever, and where no measures of disinfection were applied. Finally, in towns where a good public water supply existed, he found the inhabitants still supplying their lodgers with contaminated water taken from private wells. In conclusion, he felt convinced that in many health resorts of France, Italy, and Spain the death rate might be reduced to the extent of 40 or even 50 per cent., if a proper system of public and domestic drainage were introduced, if a supply of pure water were rendered obligatory and all private wells closed and, finally, if all persons suffering from infectious diseases were isolated and their rooms rigorously disinfected.

Fireproof Paint.

It is said an effective composition for fireproofing exterior surfaces may be formed by slaking a sufficient quantity of freshly burned quicklime of the best grade, and when the slaking is complete there is added such an amount of skim milk, or water in its absence, as will make a liquid of the consistency of cream. To every ten gallons of this liquid are added, separately and in powder, stirring constantly, the following ingredients, in the order named: Two pounds of alum, twenty-four ounces subcarbonate of potassium or commercial potash, and one pound of common salt. Whatever tint is used, it is incorporated at this stage, and the whole, after being strained through a sieve, is run through a paint mill. When ready to apply, the paint is heated nearly to the boiling point of water, and is put on in its hot condition.

Testing Well Water for Sewage.

Professor Blake, of the University of Kansas, makes a valuable suggestion for testing well water for sewage contamination. The ordinary way, where contamination from a given cesspool, vault, or sewer is feared, is to pour salt water into the suspected source of contamination, and, after a time, to test the well water for salt, by means of nitrate of silver. In fact, as salt is always present in considerable quantity in sewage and house wastes, the presence of salt in well water is presumptive evidence of contamination. It is not, however, positive evidence, as many innocent soils contain chlorides, and Professor Blake proposes that a lithium compound should be used instead of common salt. Lithium is a substance so rare that it would hardly be found in any natural soil, and a very small quantity can be detected by means of the bright red line which its spectrum shows in the spectroscope. According to the best authorities, one forty-millionth of a grain of lithium will give the red line clearly. Professor Blake proposes to make a test by dissolving one ounce of carbonate or chloride of lithium in a quart of water, and pouring the solution into the suspected cesspool or vault. After a week or more, the well water is examined, by evaporating a little of it, dipping a platinum wire in the concentrated liquid, and holding the wire in a Bunsen gas flame. If, on looking at the flame with a spectroscope, the lithium line is seen, the contamination is proved.—*Amer. Architect.*



A RESIDENCE AT SURBITON.

PATENTS.

Messrs. Munn & Co., in connection with the publication of the **Scientific American,** continue to examine improvements and to act as Solicitors of Patents for Inventors.

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The Carpenter.

Probably there is no one of the building trades in which the opportunities for advancement are so many and so certain as in carpentry. The prominence and importance of the wood-worker's art has made the carpenter the leading mechanic upon modern buildings. The carpenter is ordinarily the virtual, if not the nominal, superintendent of the building upon which he is engaged. Accordingly, he is required to know all the peculiarities of the various trades which enter into the construction of a building. He must be familiar not only with his own trade, but he must likewise know very much about that of the mason the bricklayer, the iron worker, the cornice maker, the plumber, etc.

If a building is to be erected without the assistance of an architect, the carpenter is the first mechanic consulted, and to him is given the general direction of the undertaking. Therefore, the carpenter in reality becomes the builder, and so well recognized is this that the two terms, carpenter and builder, are used almost synonymously. The carpenter's general and special knowledge is made use of at every stage in the progress of a building.

He is very frequently called upon to lay off the ground upon which a building is to be erected. It is often the carpenter who pronounces the foundation satisfactory or otherwise before the superstructure is commenced. It is the carpenter who sees that the iron floor beams are placed exactly right. It is the carpenter who prepares the centers for the bricklayer and the mason, and sees that their respective parts of the building are left in proper condition. It is the carpenter, in the wording of many specifications, who must supply whatever is necessary for the completion of the building, and which has not been included in any of the other trades.

If any new feature of work is introduced in a building for which there is not a special contractor, it ordinarily falls to the carpenter's lot. Whatever shortcomings there may be in the plans, whatever errors have been made by the architect, it becomes the duty of the carpenter to overcome and make compensation for. It is necessary for the carpenter to know everything about the building from beginning to end, and the more thorough and practical his knowledge, the more rapid his advancement and the wider his field of operations always becomes.

There are several distinct stages in the carpenter's career. First, the apprentice and helper; then the common mechanic, working under a foreman; next he becomes foreman, directing workmen under him, and has the superintendency of the building upon which he is engaged. From this he easily steps into business on his own account, and takes contracts for the erection of buildings.

Not infrequently he combines a theoretical knowledge of architecture with his practical experience as a builder, and enters upon a professional career with decided chances of success. The rate of his advancement from stage to stage depends largely upon the natural ability of the man, his care in studying the various parts of his trade, and close attention to business. Of course, something is attributable to opportunities, but, all things being equal, the man who is the most earnest in acquiring knowledge concerning his trade, who secures a fund of information from which he can answer almost any question that may come up in his daily work, and who provides ready means for overcoming any unusual difficulties that may arise, is likely to make the most rapid advancement.

Carpentry pure and simple may be defined as the art of combining pieces of timber for the support of any considerable weight or pressure. The theory of carpentry depends upon two distinct branches of mechanical science. The carpenter gives his timbers their form by the principles of geometry, and he adjusts the stress and strain so as to preserve them in their original shape by the laws of mechanics. In the wide range of application of these branches of science the carpenter finds ample field for exercise of his best powers; his familiarity with them forms the foundation of his usefulness, and in a measure, aside from the relative importance attaching to his trade, gives him an advantage over other mechanics.—*Southern Lumberman.*

PAINT FOR SHINGLE ROOFS.—One bbl coal tar, 10 lb. asphaltum, 10 lb. ground slate, 2 gals. dead oil. Add the dead oil after the others have been mixed by aid of heat.

A RESIDENCE IN WEST BROOKLYN.

We publish in this issue, on page 3, a photographic view and floor plans for Mr. Troast's residence at West Brooklyn, New York. The view was taken specially for the SCIENTIFIC AMERICAN. The piazza extends across the front of the house; and on the side to the front entrance door, the roof of which is supported by turned posts, effectively arranged, the octagon shown on the piazza adds considerably to the general effect. The hall is reached through a vestibule which shuts it off from the piazza, giving privacy, and is a convenient place for a hall stand, being well lighted, etc. The parlor is 14 × 18, and connected with the library by sliding doors. The library is 11 × 12, and this room again is connected with the dining room by sliding doors, the whole giving a first class arrangement. The size of the dining room is 14 × 14, with the bay window. There is a convenient back entrance. Kitchen is 10 × 12, with pantry. On the second story there are three good chambers. There are also three bed rooms in the attic. The house is built of brick to the first tier of beams, clapboarding to the second tier of beams, and rest of the house is of shingles. The whole is very effectively tinted, and has a pleasing effect. The total estimated cost is $4,500.

A COTTAGE AT DUNWOODIE.

We illustrate on page 4, with floor plans, a villa erected for Mr. C. B. Ferry, at Dunwoodie, New York. Dimensions: Front 30 ft. 6 in.; side 41 ft., not including piazza. Height of first story ceilings 9 ft. 6 in.; second 9 ft. Underpinning of stone. The first story is clapboarded, painted light olive green, with dark olive green trimmings; second story shingled, stained senna, roof shingled, painted red. The villa is replete with all the modern conveniences, is finished with hardwood (cherry) trim and mantels, with reception hall, library, parlor and dining room, all with open fireplaces. Hall contains an ornamental staircase. Kitchen and butler's closet are wainscoted and fitted up complete, ranges in fireplaces, dressers, etc. Three bed rooms, den and bath room on second floor. Three rooms can be finished off in attic if desired. Cemented cellar. Heated by furnace. Cost $5,000 complete. Architect C. E. Miller, New York. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

A DWELLING AT HOLYOKE, MASS.

Our illustrations, page 5, represent a dwelling, with floor plans, erected for Mr. J. A. Callahan, at Holyoke, Mass. Mr. H. H. Gridley, of Holyoke, architect. Dimensions: Front 32 ft.; side 52 ft. 6. in., not including piazza. Height of first story ceiling 9 ft. 6 in.; second 9 ft. This house, although erected for two families, has the appearance of a private residence. It furnishes complete housekeeping apartments for each family, and neither intrudes on the other. Underpinning of brick. First story clapboarded, second story shingled, painted colonial yellow, with ivory white trimmings. Roof shingled, painted red. Trim throughout whitewood, stained and finished in cherry. Fireplaces where shown have tiled hearths and hardwood (cherry) mantels with plate glass mirrors, etc. Kitchen and bath room are wainscoted, and each are fitted up complete with all the necessary appointments. Hall contains an ornamental staircase. Three rooms in attic, also storage room. Cemented cellar contains separate apartments for each tenant, outside and inside entrance thereto. Ceilings corniced. Cost $5,500 complete. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

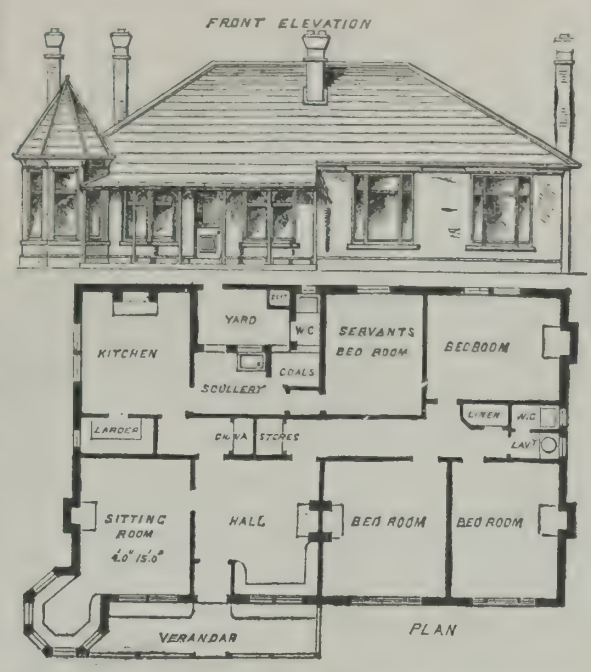
A RESIDENCE AT MONTCLAIR.

We present on page 1 and page 8 engravings and floor plans of a residence erected for Mr. Joseph Van Fleck, Montclair, N. J.

Dimensions: Front, 45 ft.; side, 39 ft. 6 in., not including piazza. Height of first story, 9 ft. 6 in.; second, 9 ft. Underpinning of brownstone laid at random, and pointed in red mortar. Exterior sheathed, papered, and then covered with shingles, painted light yellow, with the exception of the circular butt shingles, which are stained to imitate redwood. Roof shingled and painted red. The lobby and front doors are of antique oak. The interior throughout is trimmed with whitewood, finished natural. Hall 8 ft. wide, contains a very pretty staircase, with newel head handsomely carved; staircase is lighted by a stained glass window. Fireplaces of brick, have tiled hearths and exquisite hardwood mantels. The two china closets in dining room have doors glazed with beveled plate glass. Kitchen and pantries are wainscoted, and all fitted up complete. There are four bed rooms with large closets, and bath room, on second floor, and four rooms in attic. Cemented cellar under the whole of building, contains laundry, furnace, and other necessary apartments. Gas, electric bells, speaking tubes, etc. Cost, $10,000, complete. Mr. J. C. Cady, of New York, architect. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

DESIGN FOR A ONE STORY HOUSE.

We give a design for a one story house of economical construction, for which we are indebted to the *Illustrated Carpenter and Builder*. It can be built for about one thousand dollars.



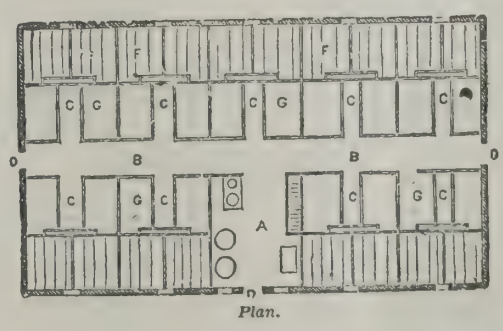
PLAN AND ELEVATION FOR A ONE STORY HOUSE.

A PIGGERY.

The accompanying engravings represent the external appearance and the plan of a large piggery. Its capacity may be increased to any extent by adding to the length at each end, with the same internal arrangements. The feeding pens are placed on a sloping plank floor, and they are readily cleaned by pushing the manure through the horizontal slits extending along each side. C C C are passages for the attendant in feeding the animals; F F F are feeding apartments; G G G are sleeping apartments; B B, the central passage. The troughs extend part way across the feeding rooms, with a board partition between them. The divisions between the feeding rooms and the sleeping apartments are a single board, six inches high, which holds the clean straw from becoming mixed with the manure. D D D are doors, through which the animals may enter; and sliding doors may be made for all apartments, and between them, for throwing the two together when desired. The space A contains the cooking apparatus, to which may be added any additional heater when necessary. Each window affords light to two apartments, and which will aid in keeping them perfectly clean. The floor has a uniform surface, with no break, the central portion being level, while the side floors for the eating pens have a slope to aid in cleaning and drainage, being about four inches in six feet. To assist in cleaning, an opening is made six inches wide along the whole length of the outside of the sloping floors, and a board six inches wide is hung on hinges at the upper edge, so that it may be hooked up for cleaning, and lowered for excluding cold air in cold weather, or opened for the admission of fresh air in warm weather. The ground should slope away from the building on both sides. Pigs are naturally cleanly animals if their owners will only give them a chance, and with a supply of clean straw for bedding, they will keep it clean.



Perspective View.



Plan.

A PIGGERY.

A COTTAGE FOR ONE THOUSAND DOLLARS.

On page 11 we give a photographic perspective and floor plans of a neat and desirable cottage recently erected at Griswold, Iowa, for Mr. Boggs, by Edward Read, builder, from plans and perspective first published in the SCIENTIFIC AMERICAN in September, 1888. The present plans show a convenient arrangement of rooms, while the exterior is very pleasing. The cost, Mr. Read states, was $1,075. He informs us he has put up a number of houses in Griswold and vicinity, from plans published in the SCIENTIFIC AMERICAN, all of which have given much satisfaction. What is true of Griswold is equally true of almost every town in the country. Wherever new buildings are in progress the SCIENTIFIC AMERICAN plans will generally be found in use. The influence of this journal in promoting the erection of improved and beautiful dwellings is very great. Every number of our paper contains a series of photographic representations of new and attractive dwellings, with the floor plans. These are not ideal pictures, but realities, the illustrations being prepared from the built houses.

These illustrations and plans are usually sufficient to enable any intelligent builder to follow them, and hence our paper is in very extensive demand. No enterprising architect or builder can afford to be without the SCIENTIFIC AMERICAN.

Fire-Clay in Montana.

As a special correspondent of the *Brickmaker* was returning from Cœur d'Alene County, he chanced to come by way of Thompson Falls, Mont., and learning of a wonderful deposit of fire-clay located about one-half mile from the city and south of the U. P. Railroad, he went to inspect it.

He found that there were three distinct strata or veins of clay, the first about three feet thick and of almost pure aluminum, as a chemical analysis has demonstrated. The second vein, about four feet thick, runs 66·7 to 67 of silica and from 19 to 24 per cent. aluminum. The third vein is about six feet thick and runs from 96 to 98 per cent. of silica. This clay lies in a blanket form between two mountains and covers from fifty to sixty acres of ground. It is the result of the decomposition of rock for thousands of years from the mountain side, and has been caried to its present position by the rapid movement of the water of Prospect Creek, which passes over a large portion of the bed of fire clay.

There is no way of estimating the value of this fire-clay deposit, as it is absolutely necessary for all the smelters and many manufacturers. It has been fully demonstrated that brick made of a good quality of fire-clay is the best material that can be used for paving the streets of cities and towns; that the durability of the brick has been tested in the most thorough manner by being placed in the streets of Wheeling, W. Va., where heavily laden drays are constantly passing over it; that it makes a pavement almost as noiseless as the Nicholson or asphaltum; that it does not cost over half as much and will last three times as long.

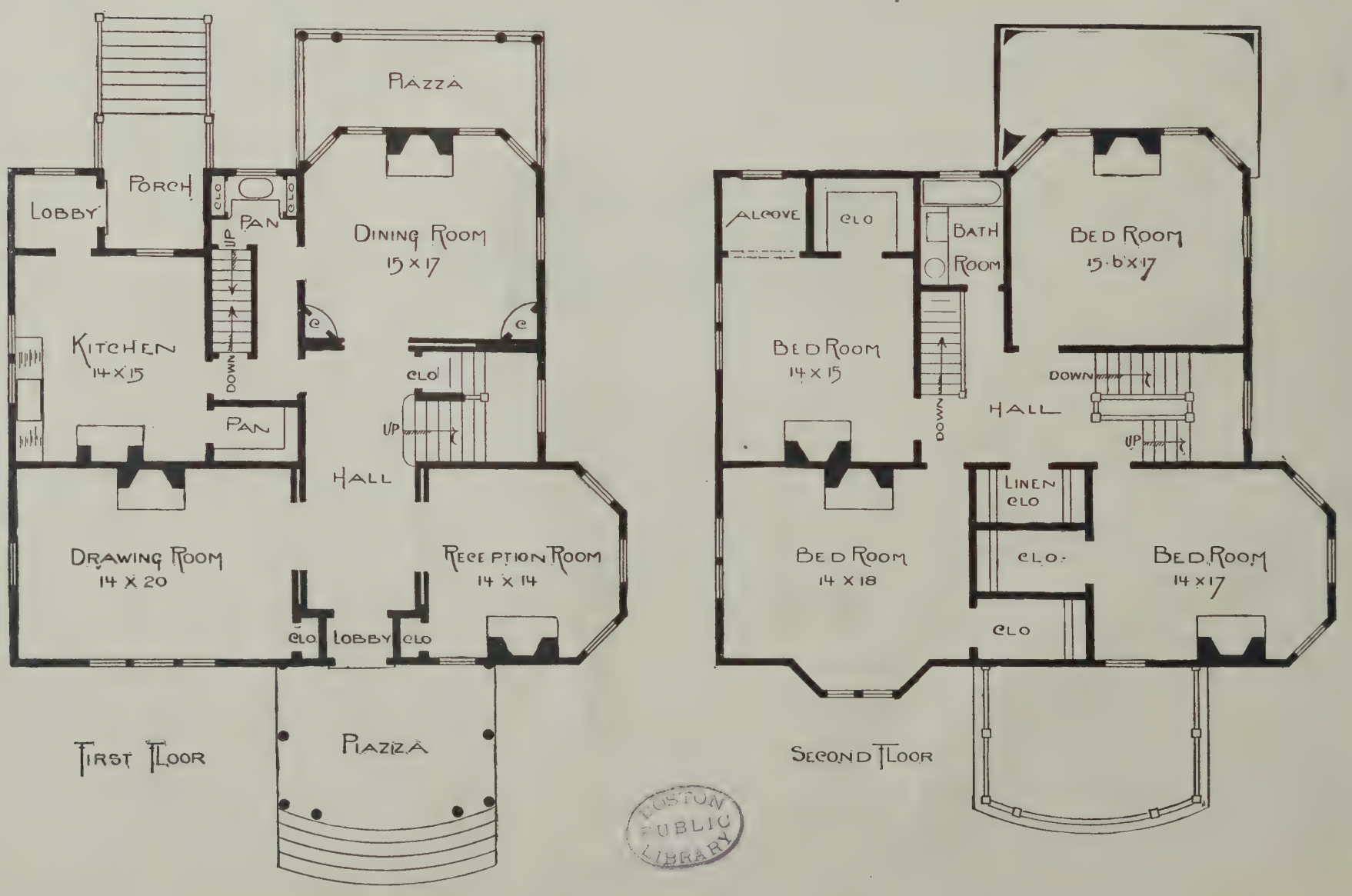
The discovery of this valuable deposit is most timely, coming just when the construction of the immense smelters at Great Falls, Butte, Helena, and other places in Montana is just beginning, and will fully answer the question as to what the streets are to be paved with at Helena, Butte, Spokane, Seattle, Tacoma, Portland, and other cities in the States of Montana, Washington, and Oregon.

The discovery of this mine of fire-clay will be a valuable addition to the wealth and resources of Montana, and it will keep within her borders hundreds of thousands of dollars which she has been annually sending abroad. Montana has not only the richest mineral fields in the world, but now we know that she has the material within her own borders for constructing the furnaces in her great smelters, and the coal and other fuel with which to operate them when they are built.

THE old paint on furniture may be removed, leaving the natural surface of the wood exposed and uninjured, by a solution of caustic potash applied to the paint, which will loosen it in a few hours, or it may be burned off by blistering with a gas jet and small bellows or blower, and scraping before it cools. An alcohol blowpipe is sometimes used.

IN connection with the publication of the BUILDING EDITION of the SCIENTIFIC AMERICAN, Messrs. Munn & Co. furnish plans and specifications for buildings of every kind, including Stores, Dwellings, Carriage Houses, Barns, etc. In this work they are assisted by able and experienced architects. Full plans, details, and specifications for the various buildings illustrated in this paper can be supplied. Those who contemplate building, or who wish to alter, improve, extend, or add to existing buildings, whether wings, porches, bay windows, or attic rooms, are invited to communicate with the undersigned. Our work extends to all parts of the country. Estimates, plans, and drawings promptly prepared. Terms moderate. Munn & Co., 361 Broadway, New York.

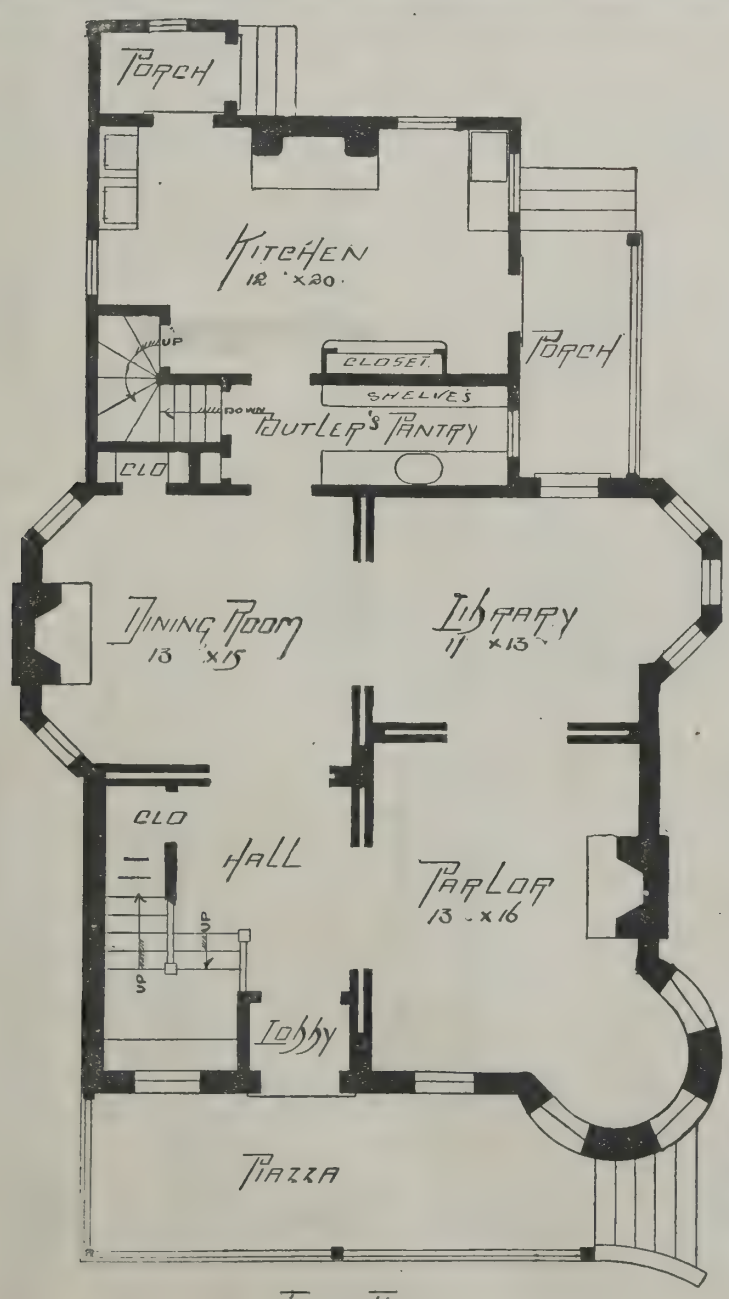




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A RESIDENCE AT MONTCLAIR. [See page 7.]

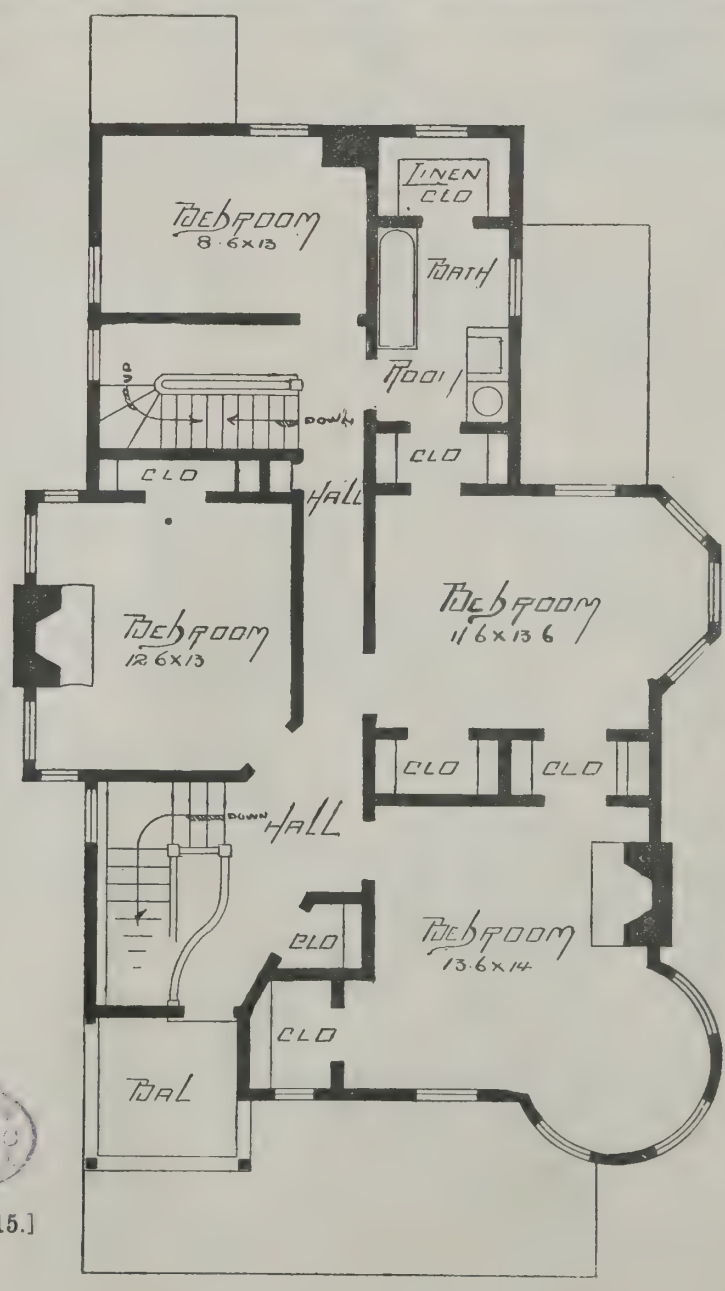




FIRST FLOOR

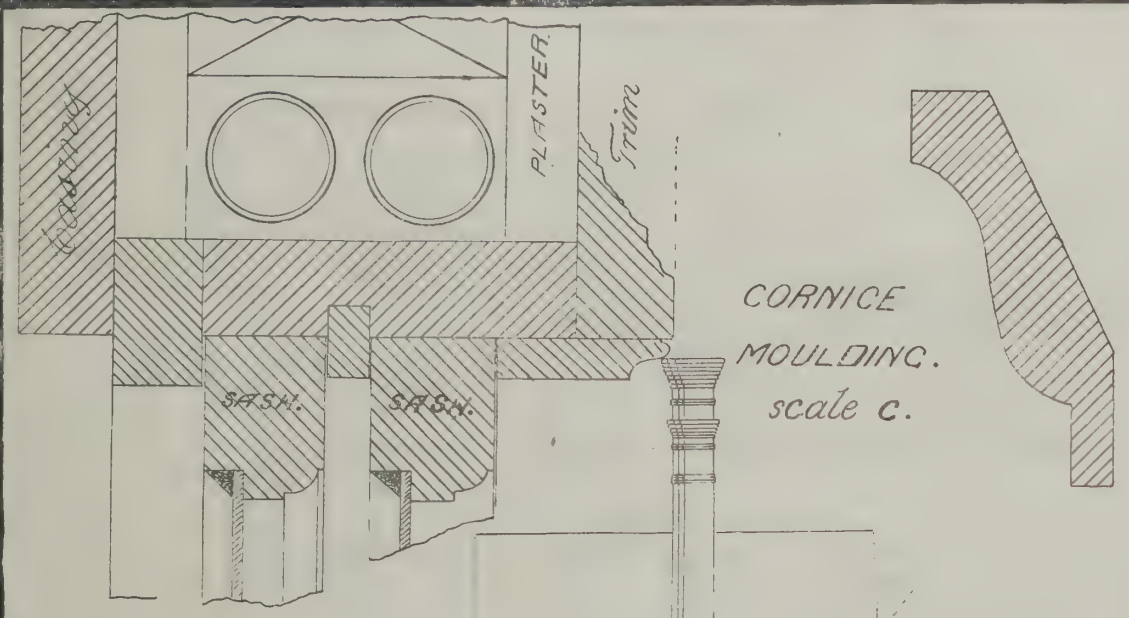
PUBLIC

[See page 15.]



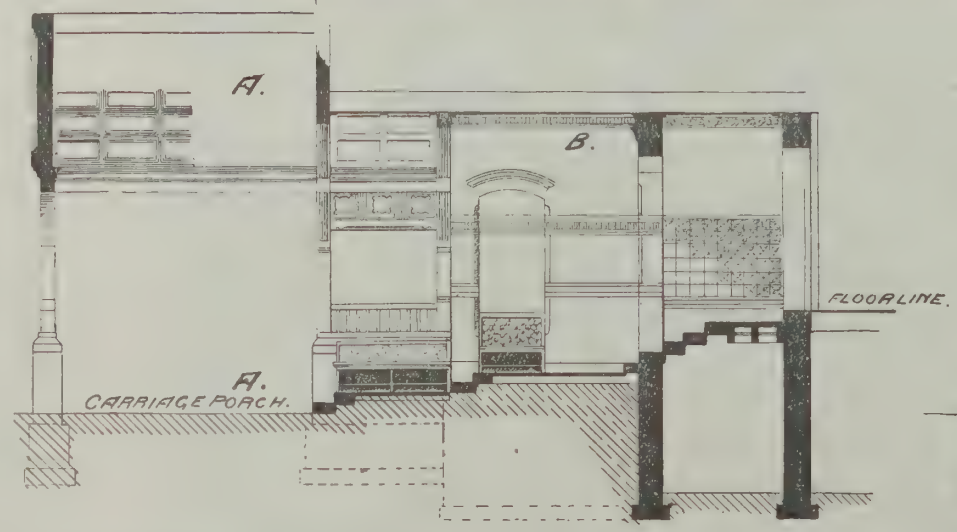
SECOND FLOOR

A DWELLING AT YONKERS.



SECTION OF WINDOW FRAME.
scale C.

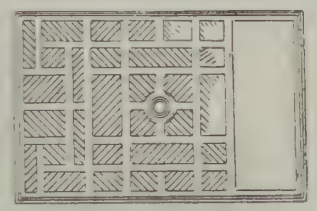
CORNICE MOULDING.
scale C.



LONGITUDINAL SECTION OF FRONT ENTRANCE.
scale A.



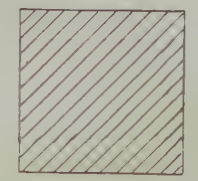
SECTION THRO' 'A-A'.
scale A.



CEILING AT 'B'.
scale A.

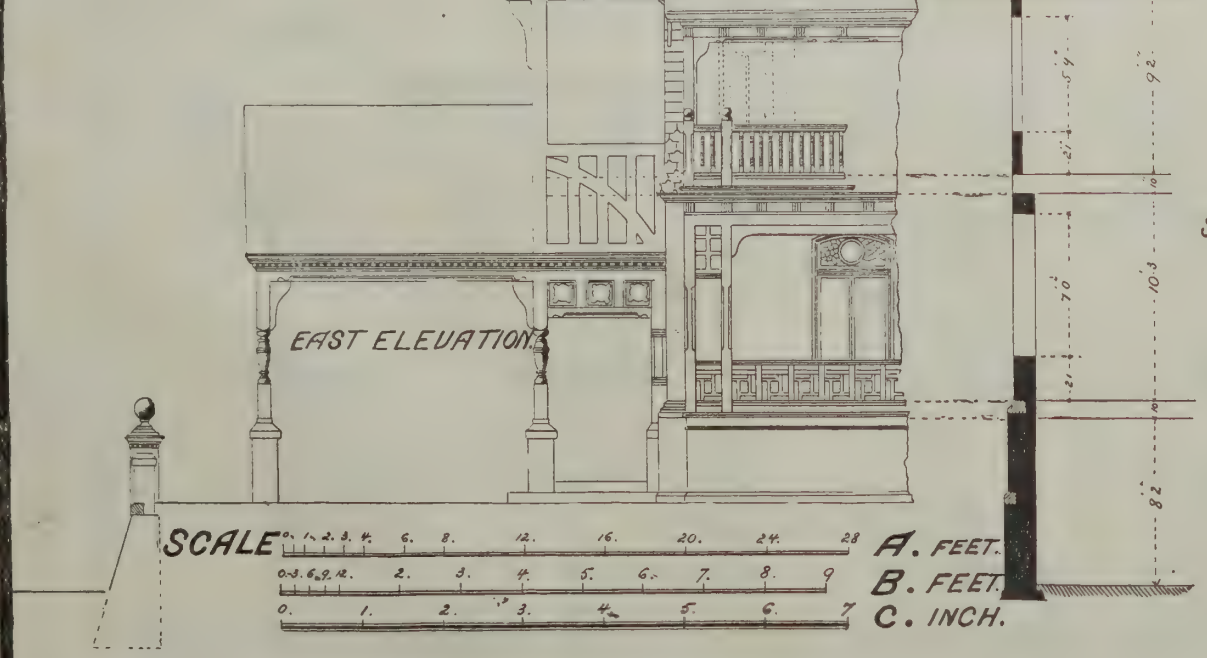


STAIR RAIL.
scale C.

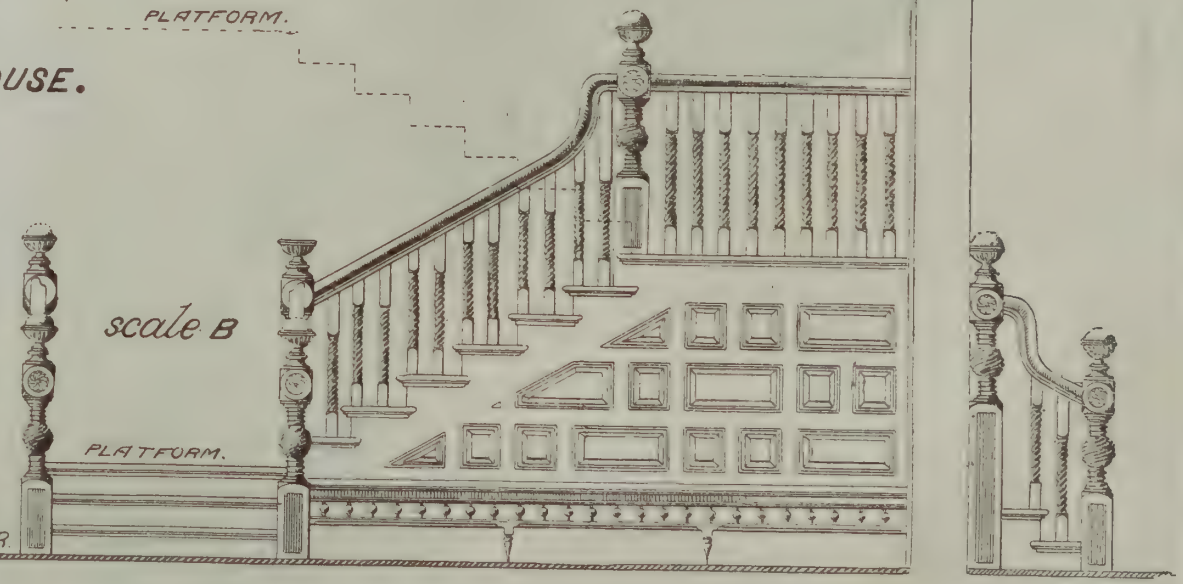


SECTION OF BALUSTER.





SECTION THRO' HOUSE.
scale A.



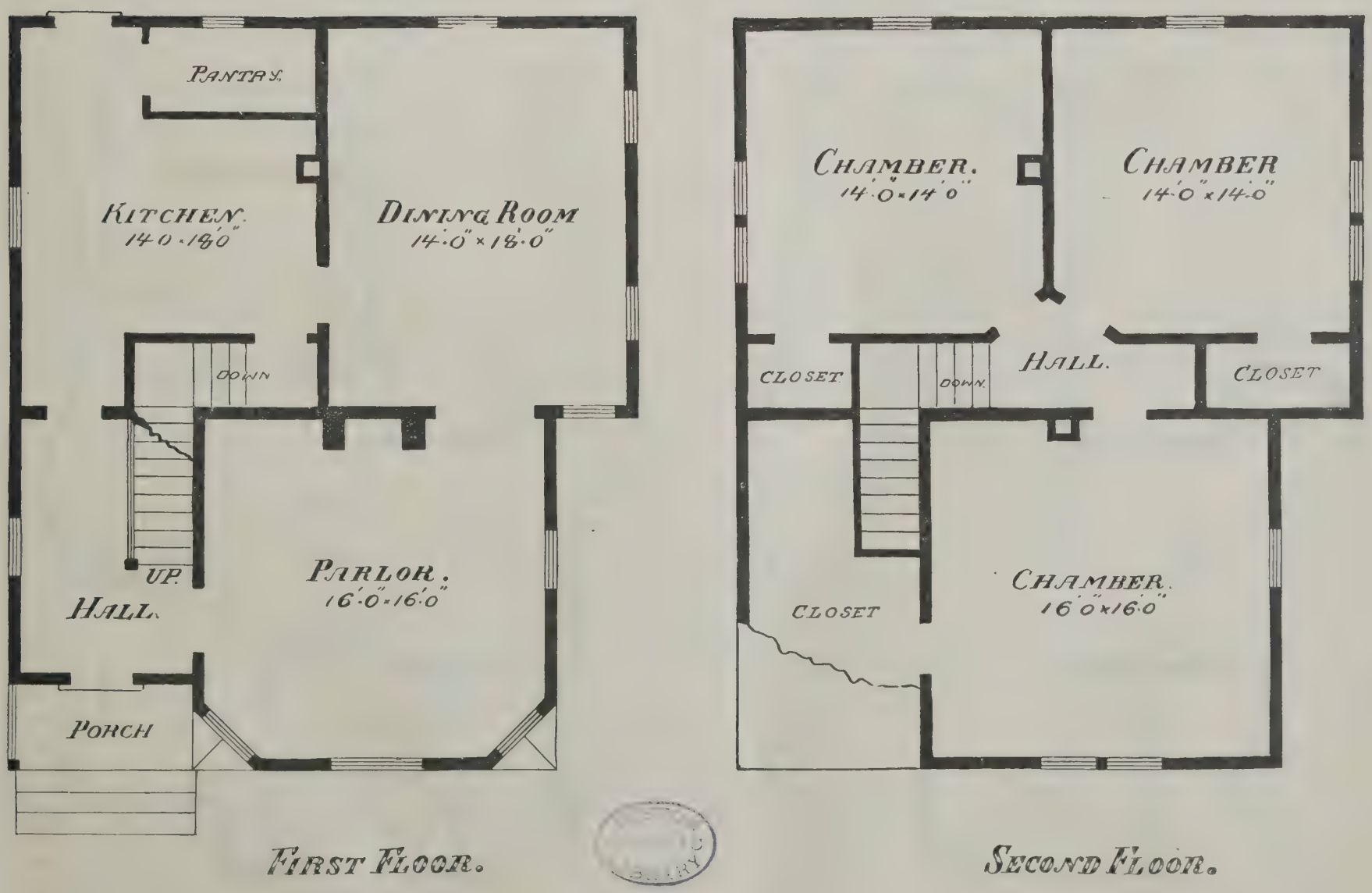
ELEVATION OF STAIR.

SIDE ELEVATION OF STAIR.

RESIDENCE OF HENRY R. TOWNE ESQ. STAMFORD, CONN.

[See page 2.]

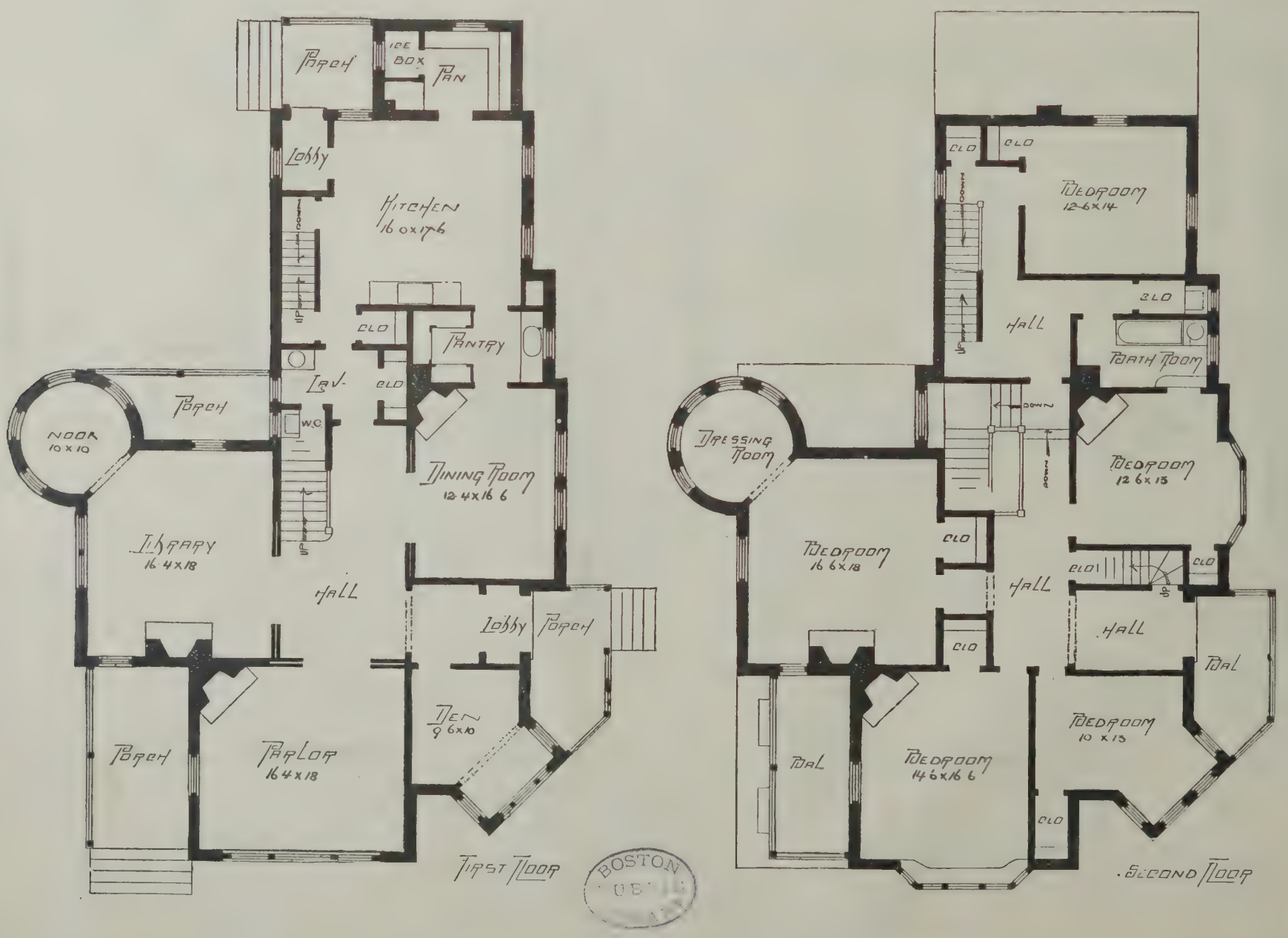




FIRST FLOOR. SECOND FLOOR.

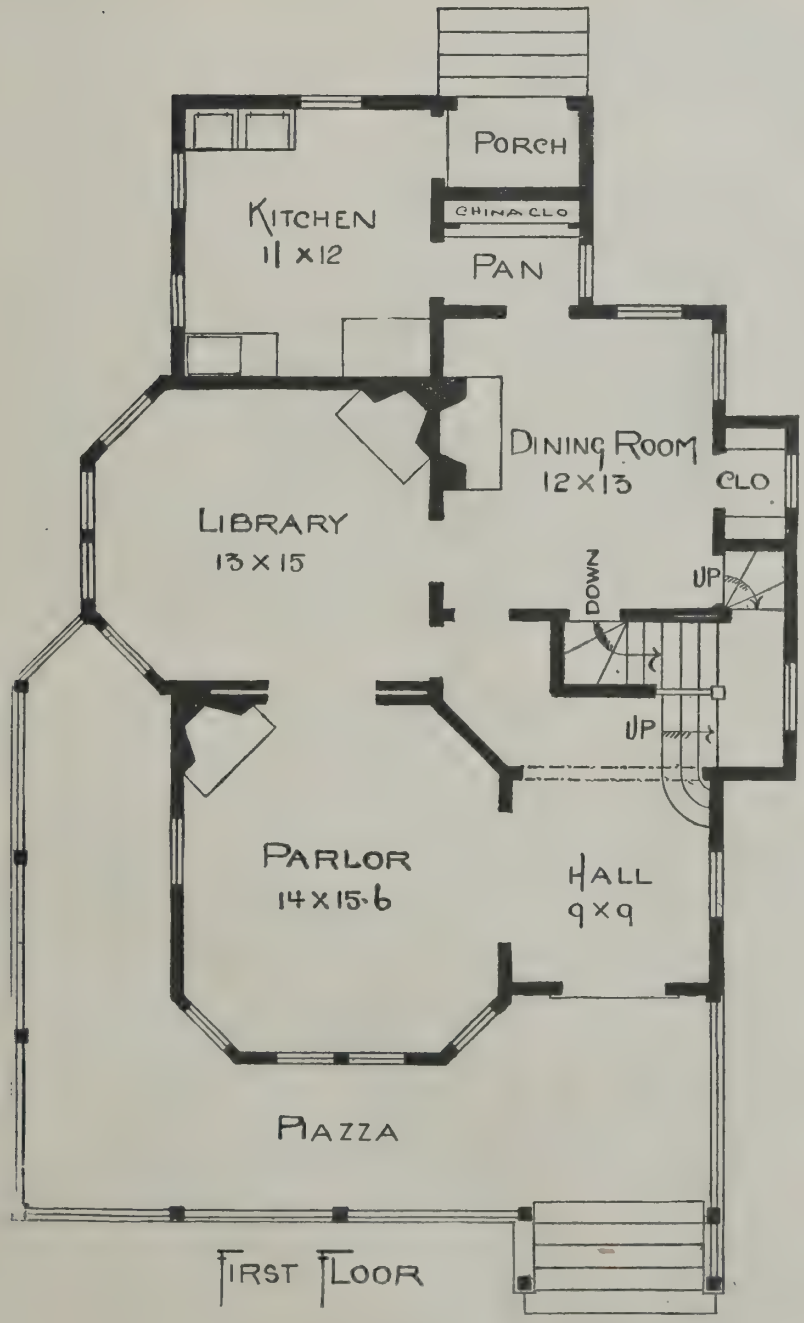
A COTTAGE FOR ONE THOUSAND DOLLARS.—[See page 7.]

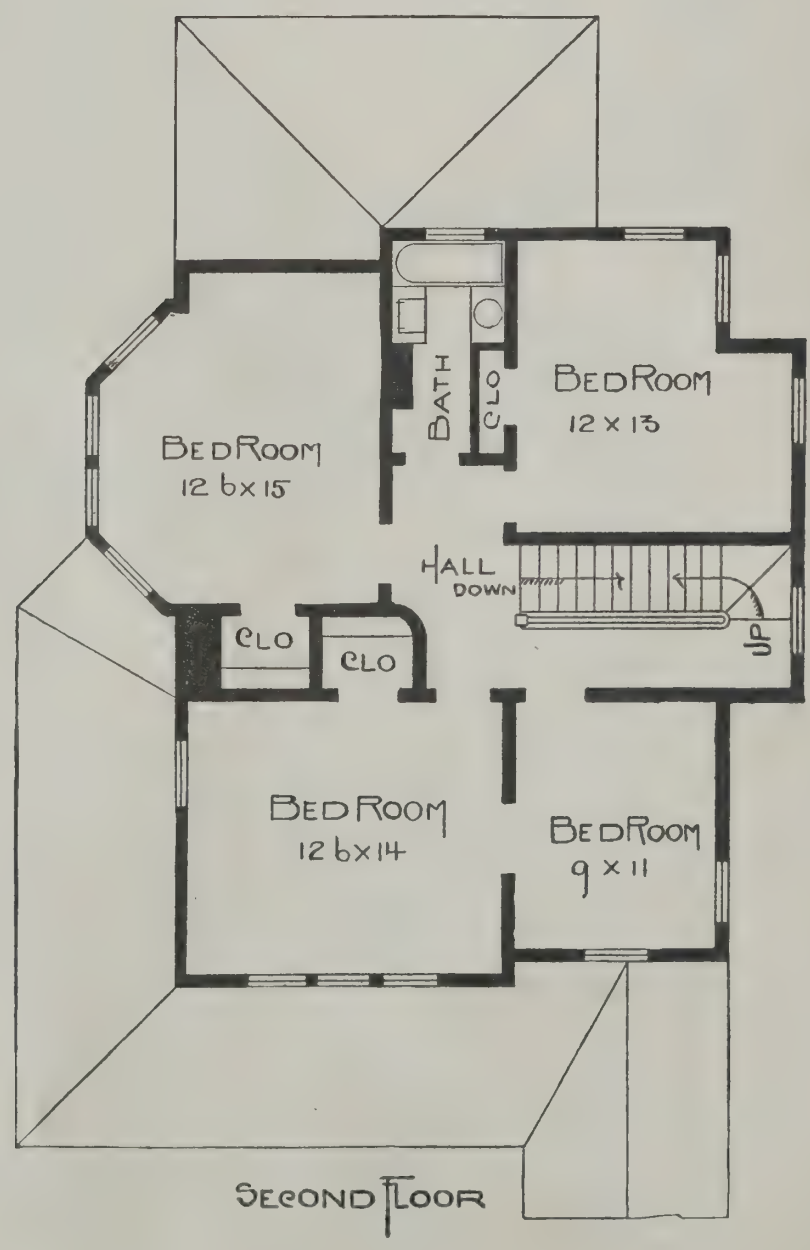




A RESIDENCE AT SPRINGFIELD, MASS.—[See page 15.]







COTTAGES AT MT. VERNON.—[See page 15.]

A DWELLING at TREMONT, N.Y.

[See page 2]

Elevation of Porch

Section of Porch

Mold at A"

Hall Beam

Section thro Parlor Window

Section of Balcony

Hall Staircase

Line of Hall Joists

Second Story

First Story

9.0

9.6

Interior of Hall Door

Staircase Window

SIDE ELEVATION

Front Elevation

Scales

Elevations 1 2 3 4 5 10 15 20 25

Details 6 5 4 3 2 1 inches 0

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CHAPEL AND VILLAGE HALL.

The chapel and village hall which forms the subject of the illustration has been designed by Mr. John T. Woodard, architect, Southampton Street, Strand, London, merely as a rustic chapel suitable for the requirements of a small village and a limited congregation. The ground plan is nearly rectangle, the body of the meeting hall being made octagonal, while three of the angles at one extremity of the ground are utilized for a platform, with a vestry on one side and an ordinary recess room on the other. The estimated cost of construction is $20,000.

A DWELLING AT YONKERS, NEW YORK.

The engraving on page 9 was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN, and illustrates a dwelling erected for Mr. C. D. Danforth, at Yonkers, N. Y.

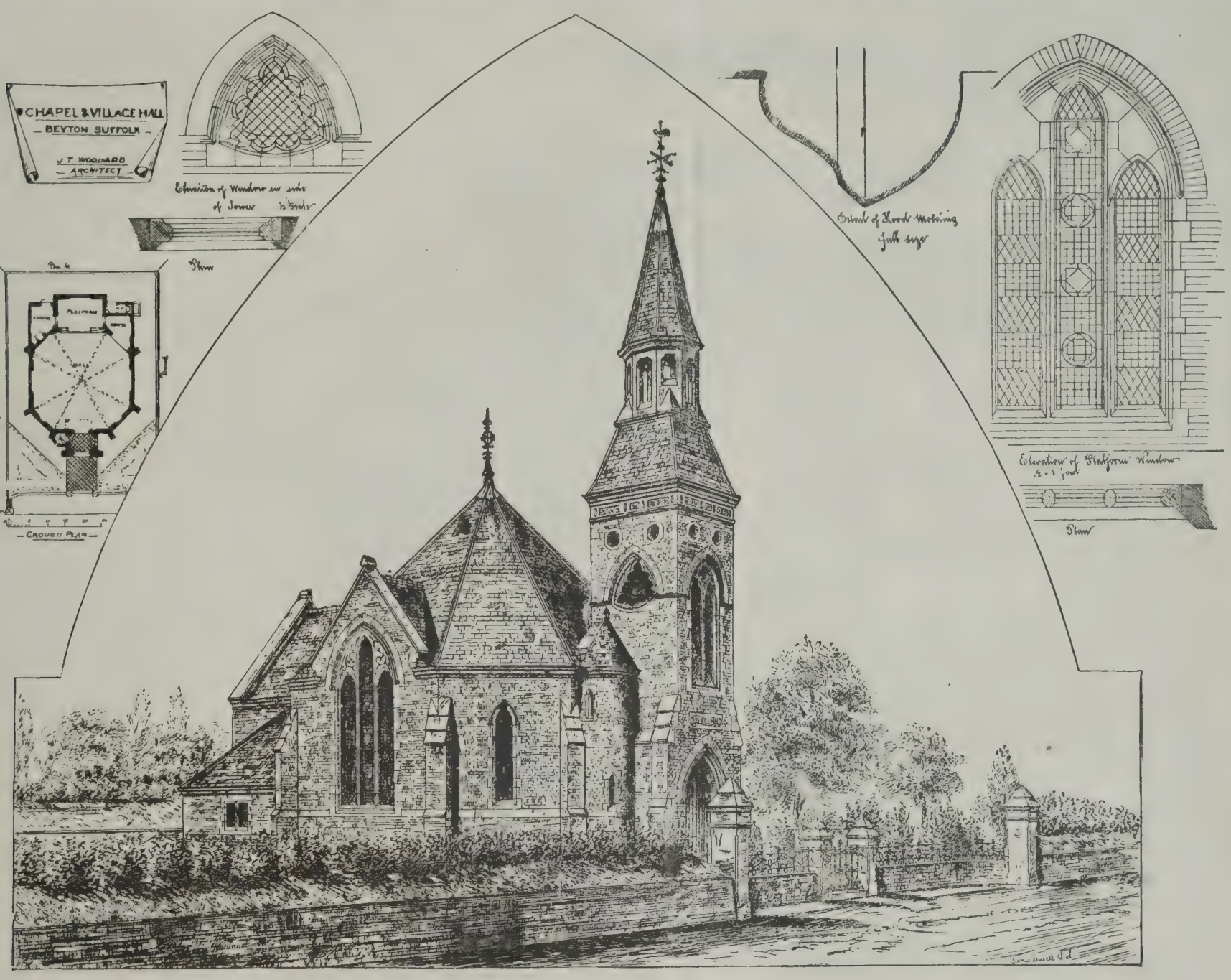
Dimensions: Front, 34 ft.; side, 52 ft., not including piazza. Height of first story, 9 ft. 6 in.; second, 9 ft. First story, except kitchen extension, of brick, laid in slate. The basement under whole of building contains laundry, vegetable cellar, store room, servants' closet, furnace room, etc. The plans show fine large rooms and numerous porches, balconies, etc. Vestibule, hall, and dining room are trimmed with brown ash; library, sweet gum; parlor and den, cherry. The hall contains a broad staircase of brown ash, with massive newels, etc., the window on landing glazed with art glass. Fireplaces throughout built of pressed brick, tiled hearths, and hardwood mantels.

Floors in hall and dining room are of ash. Kitchen and pantries are trimmed and wainscoted with hard Southern pine; floors of red birch; these apartments are fitted up complete. Second floor contains five bed rooms, large closets, and bath room These rooms are trimmed with various kinds of hard wood. Three bed rooms and trunk room in attic. The plastering is all three-coat work, the last coat rough or sand paper finish, painted, the walls in oil tints, ceilings in water colors. The windows are glazed with plate glass. Cost, about $15,000. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

RIPON CATHEDRAL.

The quiet little country town of Ripon, in the northwest part of Yorkshire, was made the see of a bishop in the seventh century, under the Saxon kingdom of Northumbria; but this bishopric remained in abeyance more than a thousand years. It was revived in 1836, the diocese including the deanery of Craven, part of the deaneries of Ainsty and Pontefract, and those populous manufacturing districts of the West Riding which contain the towns of Leeds, Bradford, Halifax, Huddersfield, and Wakefield.

The Cathedral at Ripon has arisen from a Benedictine monastery founded by the monks of Melrose, but which gave place, under the Normans, to a convent of Augustinian canons, and this was converted, after the reformation, into a collegiate church. The archbishops of York held the manor of Ripon, and often resided there, in the twelfth and thirteenth centuries, when they built the older parts of the existing cathedral, in the Transition and Early English Gothic styles; but parts of the choir, and the nave are perpendicular architecture of the fifteenth century. The chapter house is a Norman building. The west front, not shown in Mr. Read's drawing, is a singularly pure example of early English; it presents a central gable, 103 ft. high, between flanking towers somewhat higher, divided by flat buttresses from the central compartment. The grace and harmony of the whole design, though its component parts are simple, will be appreciated by a correct taste; but this front is too narrow for an effective view, and the artist has preferred a view from the southeast, showing the choir and south transept, with low central tower.—*Illus. London News.*



A CHAPEL AND VILLAGE HALL.

A RESIDENCE AT SPRINGFIELD, MASS.

Our engraving, page 12, illustrates a residence erected for Mr. E. W. Shattuck, at Springfield, Mass. Richmond & Seabury, architects, same place.

Dimensions: Front, 49 ft.; side, 74 ft., not including piazza. Height of first story ceiling, 9 ft. 6 in.; second, 9 ft.; exterior walls built of brick; trimmings of "rock faced" brownstone. Roof covered with Monson Maine red mortar; tower of rock faced bluestone; second story, clapboards and shingles, painted light brown, with dark brown trimmings; roof slated. Principal rooms connected by double sliding doors. Trim, whitewood; hall, parlor, library, and dining room are stained and finished in ebony. Hall contains a unique staircase, with pretty turned newel and candelabra, seat on landing, windows glazed with stained glass. Fireplaces are fitted up in excellent style, with rich tiling and hardwood mantels, elegantly carved. Kitchen and pantries are wainscoted; trim finished natural. Provided with the best improvements. Fireplace faced with white tiling. Second floor contains four bedrooms, large closets, linen closet, and bathroom. These rooms are finished in cherry and oak, respectively. Two rooms and billiard room in attic. Cemented cellar. Heated by furnace. Ceilings corniced. Gas, electric bells, etc. Cost, $9,000 complete. Mr. E. A. Quick, of Yonkers, architect.

COTTAGES AT MOUNT VERNON, N. Y.

On page 13 we give floor plans and photographic perspective of cottages of low cost erected for the late Hon. Charles Crary, at Chester Hill, Mount Vernon, N. Y. The plans of one cottage will suffice, as the same number of rooms are obtained in each house. Dimensions: Front 32 ft. 3 in.; side 43 ft., not including the 7 ft. piazza. Height of first story ceilings 9 ft.; second 8 ft. 6 in. Underpinning brick. Exterior clapboarded, and painted flaxen yellow, with Newport tan trimmings. Shingles stained to imitate redwood. Roof covered with Maine slate. Cemented cellar under whole of house. Plans show a convenient arrangement of rooms. The trim throughout is of whitewood, stained and finished in cherry. The doors and windows have beaded casings and turned sunk angle blocks. Hall contains an ornamental staircase. Fireplaces of brick, have facings and hearths of tiles, and hardwood cabinet mantels with plate glass mirrors, etc. Floors are of Georgia pine laid in narrow widths Kitchen and pantry are trimmed and wainscoted with similar pine, and are fitted up in best manner. There are four bed rooms and bath room on second floor, the latter wainscoted with ash and cherry. Four rooms in attic. Cost $4,000 each, complete. Mr. J. C. Brown, of Mount Vernon,

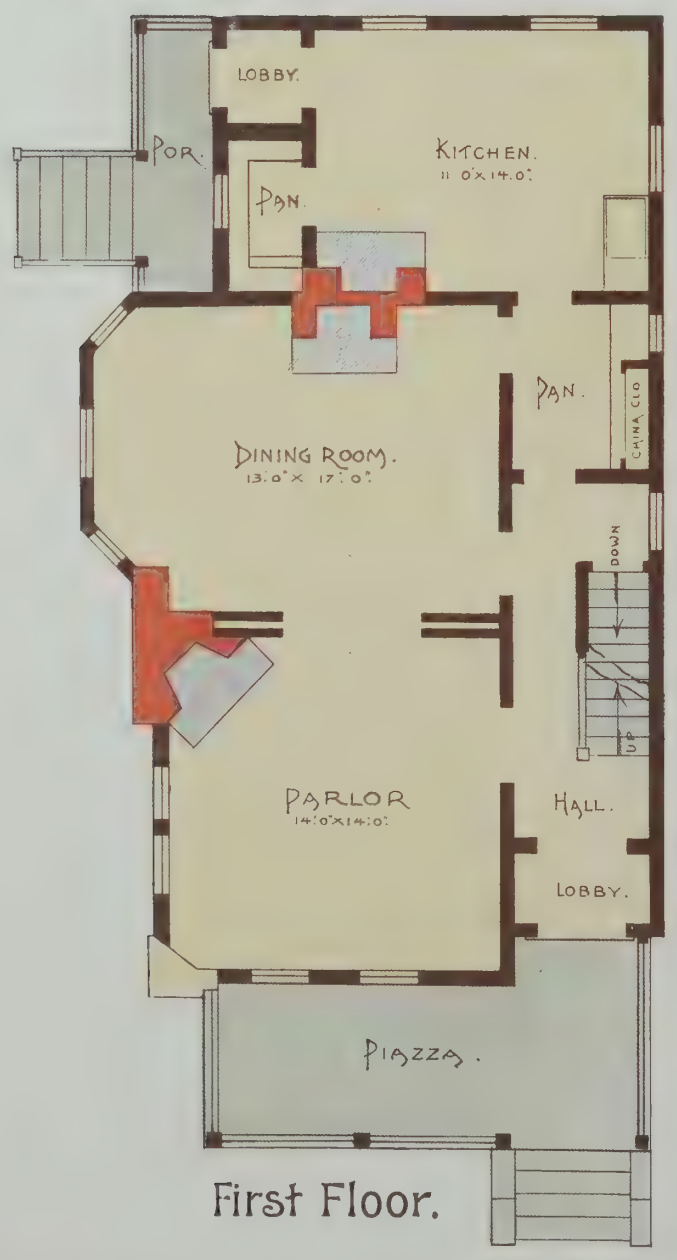
THE *Handels-museum*, in calculating the world's consumption of coal, reckons that the steam engines of the world come to 10,000,000 horse power; that these use about 12,000 tons of coal per hour on the average; that gas lighting consumes 10,000 an hour; gas engines, 4,500; iron smelting, 5,000, and other metals 4,000 tons an hour; other factories, 5,000 tons, and domestic heating, 10,000 tons an hour; all which comes to over 50,000 tons an hour. On the other hand, the whole output is 550,000,000 to 600,000,000 tons per annum, or about 65,000 tons per hour.



RIPON CATHEDRAL.—DRAWN BY S. READ.—[See page 15.]



A DWELLING AT TREMONT N.Y.



First Floor.



Second Floor.

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RESIDENCE OF HENRY R. TOWNE ESQ. Stamford Conn.



First Floor.



-Second Floor.

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SCHUMACHER & ETTLINGER, NEW YORK

THE SPENCE HOT WATER HEATER.

This heater has, through the efforts of its manufacturers, been brought very prominently before the trade and general public, and has, on account of the universal satisfaction which it has given, established for itself a very commendable reputation. It represents the development of thirty years of study and labor on the question as to how economy, durability, and efficiency could be best combined with simplicity and beauty of design. Previous to 1888 this heater had been manufactured in the Dominion only, but in that year the patent rights for the United States were secured by the National Hot Water Heater Co., of Boston, who began to manufacture it in Fitchburg, Mass., and have introduced into its construction certain features of acknowledged merit and desirability, without, however, changing the fundamental principles.

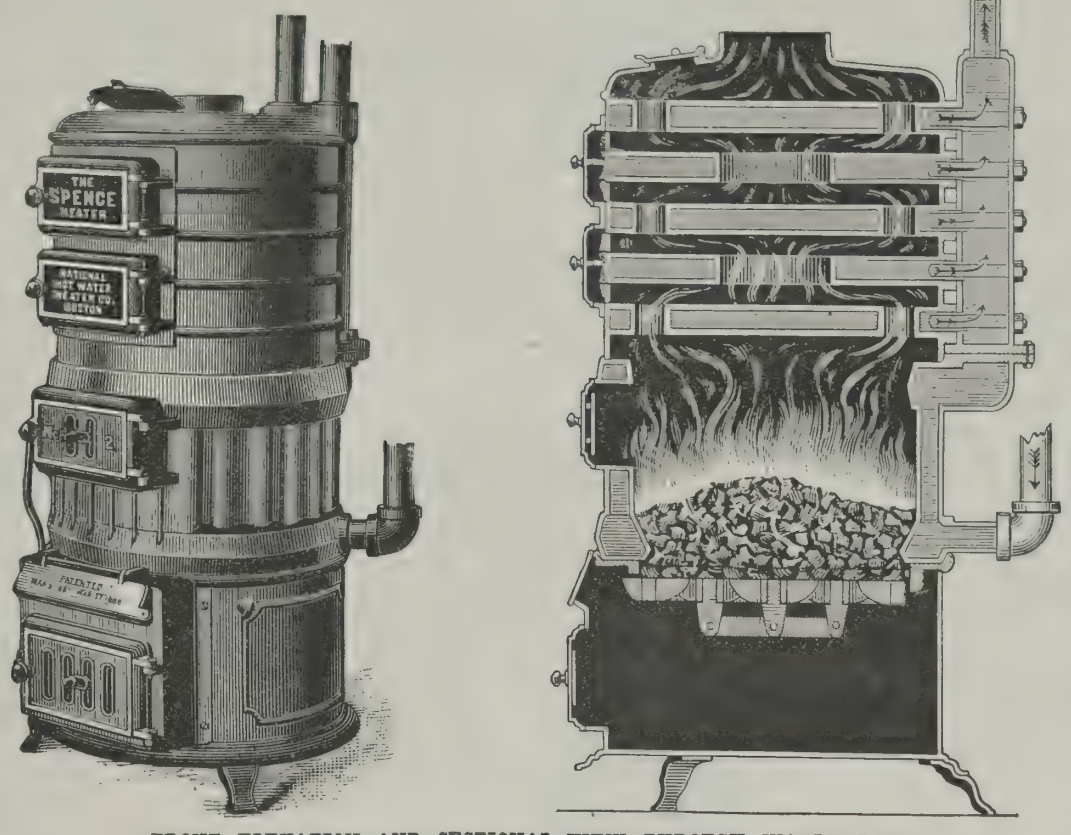
A general idea of the construction of this heater, as it is now manufactured, may be obtained by referring to the accompanying cuts. As may be seen, it is sectional in construction, portable, easily set up and composed of a few parts.

The sections are of two distinct patterns, one having a single smoke flue in the center, and the other having six smoke flues distributed in the form of a hexagon. The area of these flues in each section is equal to the area of the opening for smoke pipe. Hence the surface of each is in every part equally affected by the products of combustion in their passage through, and none go to waste into the chimney. Through the clean-out doors, which are two in number and of square design, all parts of these sections requiring to be cleaned are easily accessible.

The firepot is of a form of construction which, after exhaustive experiments, has been found to be the best adapted to hot water heating. No fire brick or other non-conductor being used, the heating surface is most efficient. The feed door is fitted with a gas damper and is sufficiently large, even in the smallest sizes, to permit the admission of an ordinary coal shovel. The grate, which combines the rocking and dumping principles, is of a new and improved design, and is so constructed as to allow for liberal air spaces, thus assuring perfect and complete combustion of the fuel. It works with very little effort and acts alike upon all portions of the fire, removing ashes as effectually near the edges of the fire pot as in the center. The ash pit, in which the grate is placed, has a clean-out door with sliding damper in it, and is also fitted with a clinker door, through which, by using the slice bar, the ashes may be removed from the bottom of the fire.

From the cut of the water post section it may be seen that the only water joints are those which connect each section with the water post at the back, also that each section is an independent heater; the water passing through only one section and not having to traverse the successive sections above. This feature of construction permits the waterways to any section to be closed by a blank gasket and the balance of the system to be run without it. This is of incalculable value in case of accident to any section, as the remaining sections can be used until a new one is obtained to replace it, and this replacing may be done without disturbing the piping, as it is only required to remove the bolts which fasten the sections to the water post.

The National Hot Water Heater Co., who are the sole manufacturers of this heater for the United States, have lately increased their facilities by establishing works at Canton, Ohio, and a branch office at No. 108 Lake Street, Chicago. They have but recently removed their Boston offices from Nos. 191 to 195 and 197 Fort Hill Square, where they have lighter, more spacious, and neatly appointed apartments for carrying on their business. For circulars relative to their heater and system they invite the public to call or address them at either of the above offices.



FRONT ELEVATION AND SECTIONAL VIEW THROUGH WATER BACK.

SECTIONS WITH SINGLE SMOKE FLUE. THE GRATE. SECTIONS WITH SIX SMOKE FLUES.

THE SPENCE HEATER.



POPPERT'S PATENT INSIDE SLIDING BLINDS.

IMPROVED SLIDING BLINDS.

A recently issued catalogue of Mr. George Poppert, of 417 Poplar Street, Milwaukee, Wis., gives detailed information in regard to his patent inside sliding blinds which it would be well for every builder and householder to consider, as these blinds can be readily applied to old as well as new houses of all kinds. The illustration suggests the ease with which these blinds work, as they are fitted with counterbalancing weights, such as ordinarily used for sash. These weights take the place of the springs back of the blindways, allowing each section of the blind to work independently of any other section. The back of the blindway is grooved to allow for the travel of the weight, the weights being entirely inclosed, and they are designed to move so readily that any child can move the blind to the desired position without effort. The 1890 catalogue will be sent free of postage to all who apply therefor.

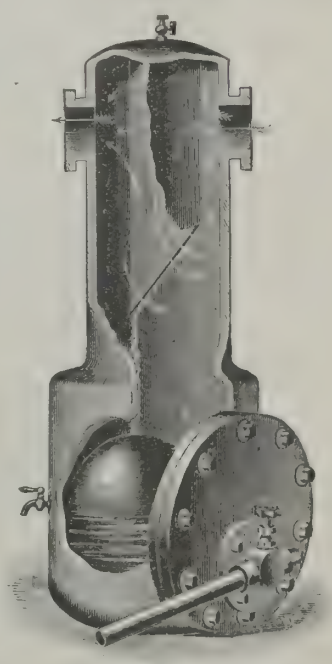
Prepared Building Papers.

The Standard Paint Company, of 59 Maiden Lane, New York, announce placing in the market two new grades of building paper. One, whose trade mark is the "Universal," is prepared with their P. and B. compound, and is designed to be thoroughly water proof, acid, alkali, and gas proof. It is sold at a very low price. The other new brand is put into the market under the trade mark of the "Giant" building paper. This paper is *completely saturated* with water proof, acid and alkali proof, and insulating material, and can be cut in any way and torn into bits, and no particle of it will absorb moisture. The attention of architects and builders is especially called to these papers, and they are urged to send for samples.

"LIGHT FOR EVENING HOURS" is the title of a handsomely illustrated and beautifully printed pamphlet just issued by the Detroit Heating and Lighting Company, of Detroit, Mich., describing their combination gas machine, and giving views of a large number of buildings and institutions thus lighted. The machine has been remarkably successful for many years, and the commendations of its excellence come from all parts of the country. When neither city gas nor electric light are available, these gas machines are almost indispensable. The company spare no effort, with the best material and workmanship, to furnish a machine which will be certain to afford long and creditable service, and that can be depended upon for safety and a steady, brilliant light.

AN IMPROVED SEPARATOR AND TRAP FOR STEAM BOILERS.

The device shown in section in the accompanying view is designed to be placed between the boiler and engine to separate water and insoluble matter from the steam. To separate grease and sediment, a grease cock is placed just below the water line, the grease being drawn off at intervals while the water flows through the trap, and the sediment being removed by taking off the cover, which removes the float and exposes the interior for inspection. The steam, in its passage through the separator, is sharply deflected downward, and then as sharply deflected upward, while the water and solids are projected against inclined faces of the deflector and fall to the base, where the water is removed by an improved balanced float trap, the valve of which is double-seated, and the float of composition, round and stiff, and designed to withstand 150 pounds pressure. Through the stem and center of the valve the float is in communication with the atmosphere. The valve area is large, and there is a pass-by valve, by which the whole can be blown out at will, a glass water gauge at the side showing the water level. This device is manufactured by the Curtis Regulator Co., 151 Beverly Street, Boston, Mass.



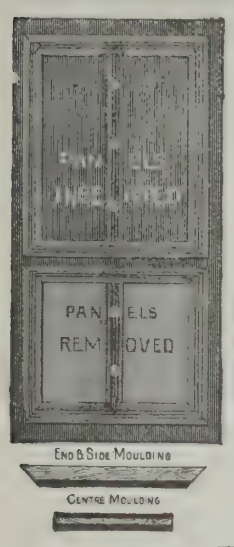
THE CURTIS SEPARATOR AND TRAP.

MESSRS. BARLOW BROTHERS, of Grand Rapids, Mich., have just issued a new catalogue and price list relative to their patent manifold shipping blanks, which they will forward upon request to all interested readers.

ZINC white with a little varnish makes the best finish for inside work, and does not turn yellow.

LYLE'S STORM AND SCREEN DOOR.

This door, patented in the United States, Canada, England and France, consists of a screen door which, to the ordinary observer, appears no different from those in common use. It is, however, so devised that the screen part can be covered by panels inserted in grooves, so that a perfect storm door is made. The grooved moulding and storm panels are quickly put on to old style doors. No other door is required in mild climate, and in the North the combined door saves the expense of a storm door, and in many rooms the expense of any other door. Any screen door is quickly made into a perfect storm door at a little expense by inserting the panels, and all the trouble of taking down the screen door, or damage to same while stored, is avoided. Address W. R. Lyle, patentee and wholesale dealer, Ripon, Wisconsin.



A SHEET COPPER STATUE THIRTY-FIVE FEET HIGH.

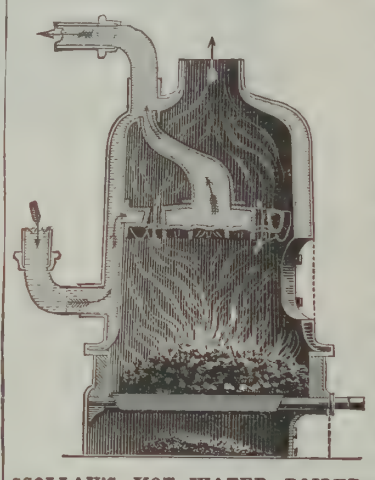
The statue shown in the illustration is of sheet copper, weighing from twenty-four ounces to four pounds to the square foot. It has recently been completed by Mr. W. H. Mullins, of 306 Depot Street, Salem, Ohio, to be erected at New Ulm, Minn., on an elaborate pedestal. The figure was modeled by Alfonz Pelzel, and it is said that about twenty tons of clay was required for the purpose. The figure itself well illustrates one popular conception of the character of the great German "Liberator," as he was called all through the middle ages and down even to the time of Napoleon. When the Romans held undisputed sway over all that was known of Germany, in the reign of Augustus, Arminius, or Hermann as he was known to the Germans, incited an insurrection so extensive that the first Roman army, under Varus, sent against the insurrectionists, was almost totally annihilated. Four or five years later successive Roman armies were likewise repulsed, and, by the magic of his name and the strength of his character, this barbaric chief was able to sufficiently combine the Germanic tribes to prevent a further acknowledgment of Roman authority beyond the Rhine, and hence has been called the "Liberator." The small figure at the side gives a good idea of the height of the statue.



A SHEET METAL STATUE OF HERMANN, OR ARMINIUS.

A BOILER FOR GREEN HOUSES, DWELLINGS, ETC.

The illustration represents an improved boiler for hot water circulation, manufactured by Mr John A. Scollay, of No. 74 Myrtle Avenue, Brooklyn, N. Y., which is very simple in construction, and has been extensively used, being adapted for either anthracite or bituminous coal or coke or natural gas. The illustration shows a sectional view of the boiler, which consists of two shells, one placed within the other, leaving a space between for water. Directly over the fire is placed a patent corrugated tubular extended rib surface inner chamber, which is made of a single piece of cast iron. The bottom of this chamber is formed of annular corrugations studded with tapered projections and has on the sides projections or ribs. These, in addition to the tubes that run through it, give an extensive heating surface. The peculiar construction is also said to add greatly to its strength. The corrugations being on the bottom of the chamber only are self-cleaning by the action of the fire. From the middle tube of this tubular chamber connection is made with the boiler proper in a way to facilitate circulation. The smoke outlet is placed at the top of the boiler, as shown in the illustration. The shaking grate is said to be simple and efficient and entirely dispenses with the use of the poker and slicing bars. A quick motion of the lever will relieve the fire box of an over-accumulation of ashes and cinders and at the same time bring the grate into proper position. The grate is constructed to allow ample air space and thus assures efficient combustion.



SCOLLAY'S HOT WATER BOILER.

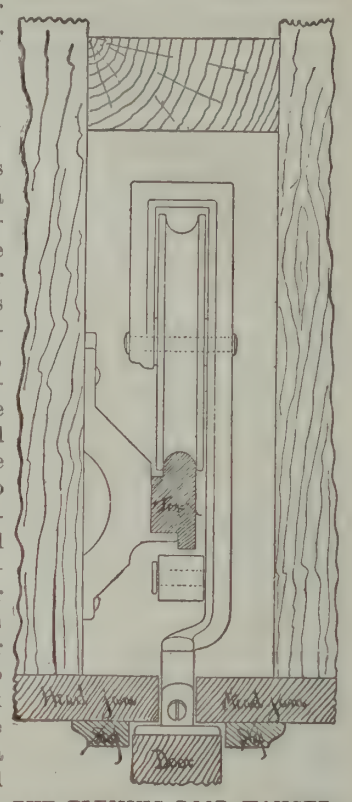
AN EFFICIENT VENTILATING FAN.

How to secure perfect ventilation in churches and other buildings where large audiences assemble has been a troublesome question ever since architecture has advanced to the position of a recognized art. All methods of ventilation which depend in a greater or less degree upon natural draught (whether assisted by hot air flues or not) for the movement of air are affected by atmospheric changes; therefore at the best only an uncertain quantity of fresh air may be expected, while in certain conditions of the weather many of these systems are entirely inoperative. A sufficient and constant supply of fresh air can, however, be obtained by the employment of a Buffalo disc fan, made by the Buffalo Forge Co., Buffalo, N. Y., as shown in the accompanying engraving. A definite quantity of air is delivered thereby at all times, and with proper preparation and construction of the air flues or ducts perfect ventilation is regularly secured, regardless of atmospheric conditions These disc fans are furnished in a large number of sizes for all classes of work, and can have power applied for church ventilation with water or electric motors, same as used for pumping church organs. In a great majority of buildings ventilation has been a secondary matter, while it should have been the first, and the arrangement of the proper sized flues, chimneys, and ducts provided for when the buildings were being constructed, so as to make thorough ventilation a success.

THE SAWYER'S OWN BOOK, of Emerson, Smith & Co., limited, Beaver Falls, Pa., is a compactly printed pamphlet of 120 pages, giving a great deal of information about different kinds of saws, their manufacture and use, which should be in the hands of all who wish to be thoroughly informed in this line. The firm claim to have been the first manufacturers in the world to introduce and use natural gas in saw tempering, stating that since its introduction their steel does not oxidize, and their saws have a toughness and uniformity of temper that they were never able to attain before.

AN IMPROVED DOOR HANGER.

The illustration shows a sectional view of a single track parlor door hanger, made by the Fleming Door Hanger Company, of Kansas City, Mo., which is designed to be simple, efficient, and economical, and which can be utilized without the aid of skilled labor. The hanger consists of two parts, one portion carrying the wheel and having inclined pins integral with its lower end, the plate with such pins having a flange for attachment to the top of the door. The track consists of a single piece of hard wood, with a rounded upper side and an offset to engage the supporting brackets, which are of cast iron. The track is securely fastened to the main partition only, and is designed to be noiseless in operation, always in line, and never out of order.



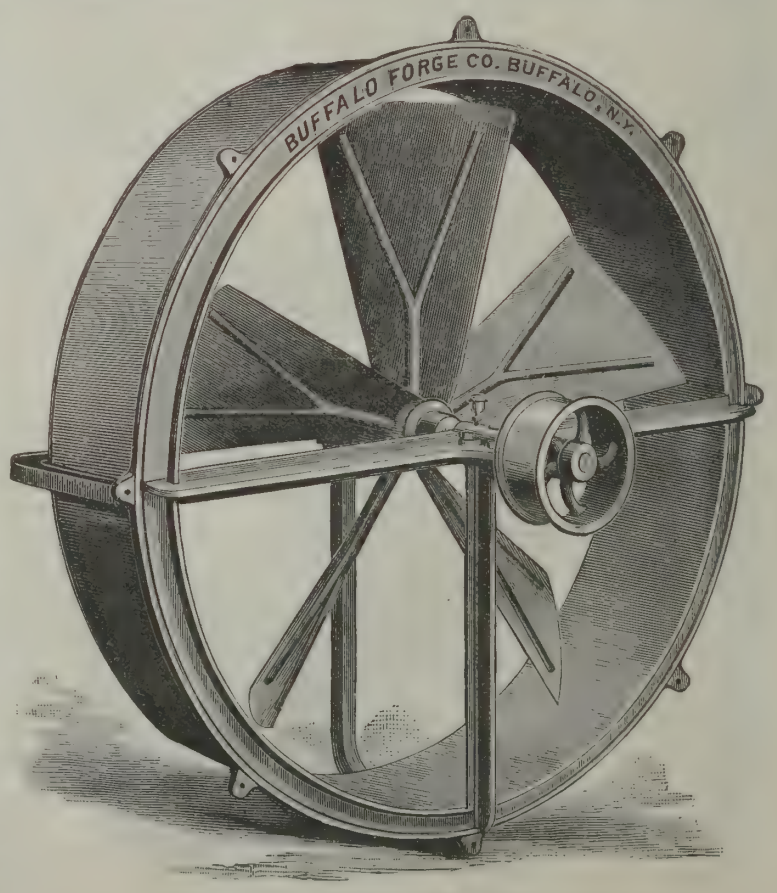
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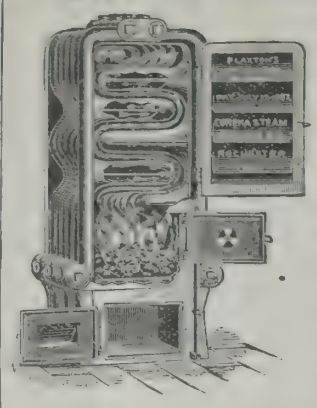
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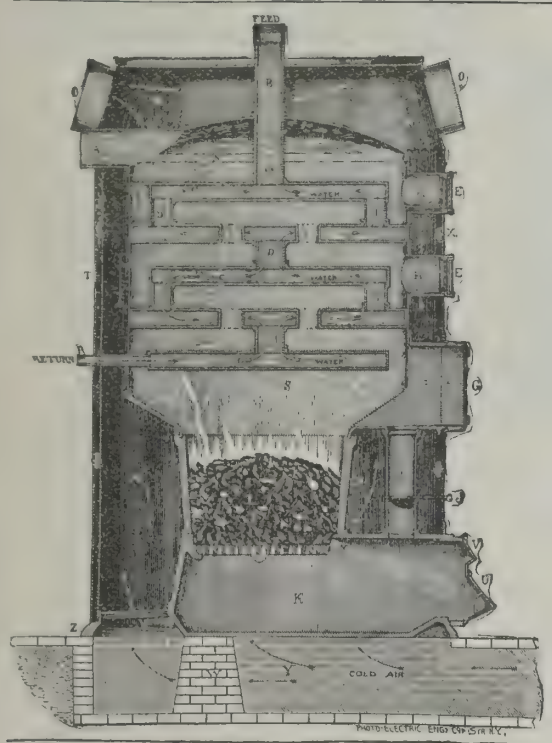
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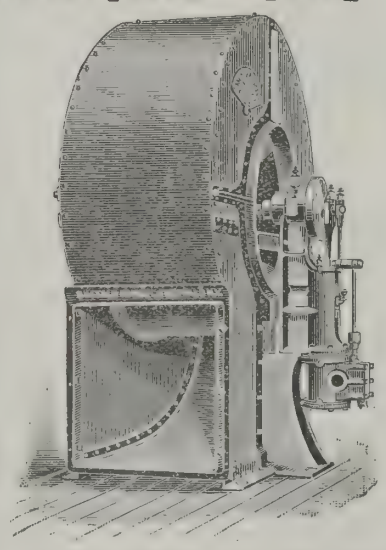
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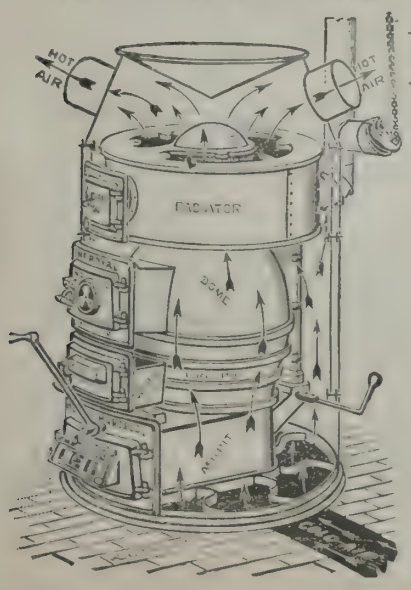
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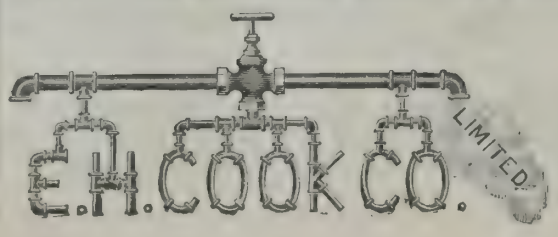
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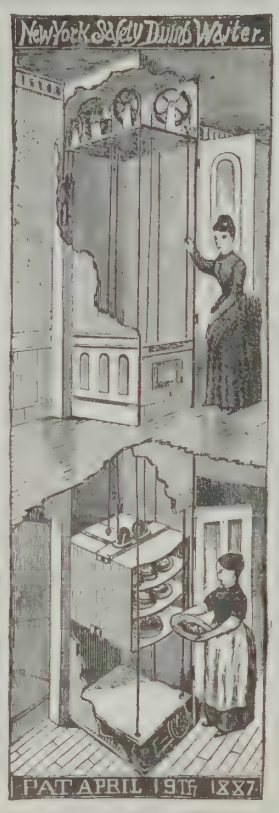
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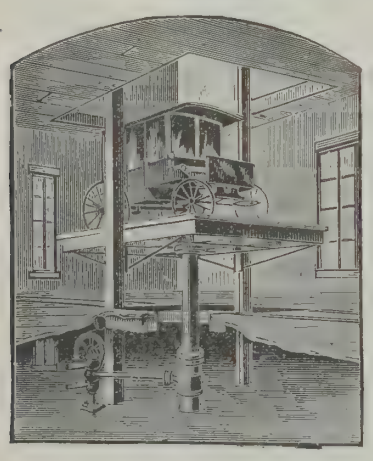


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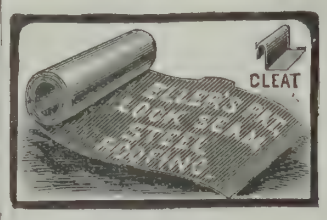


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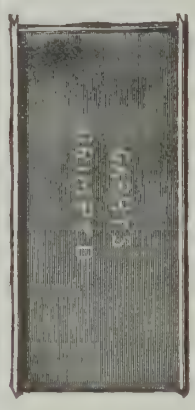
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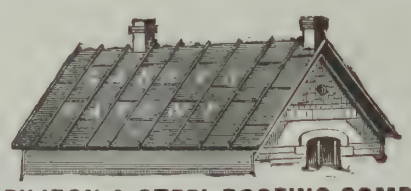
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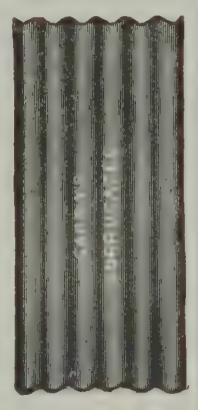


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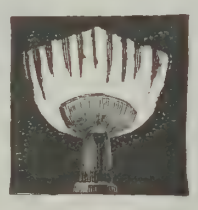
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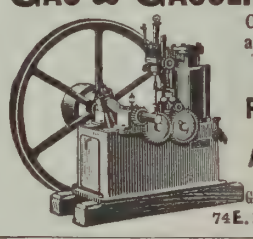
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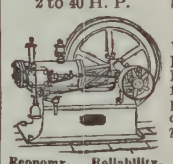
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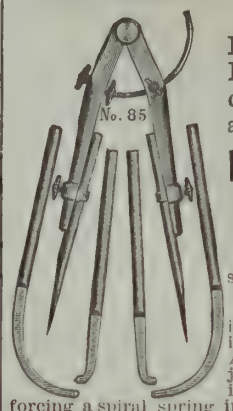
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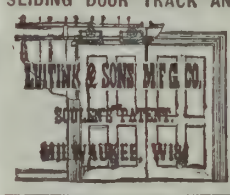
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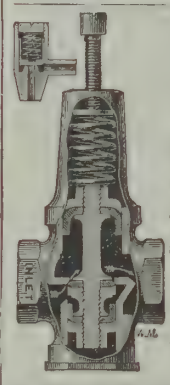
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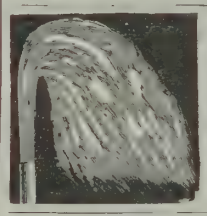
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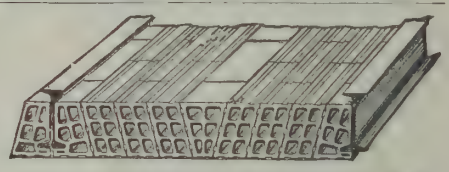
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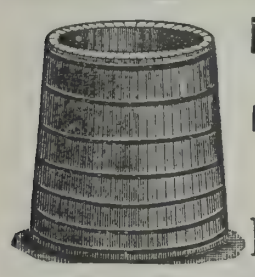
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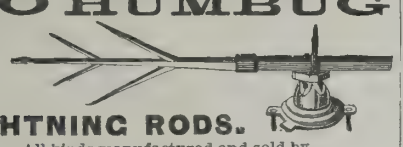
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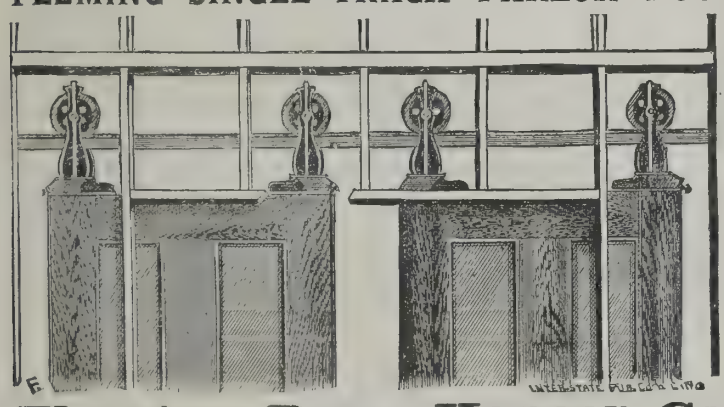
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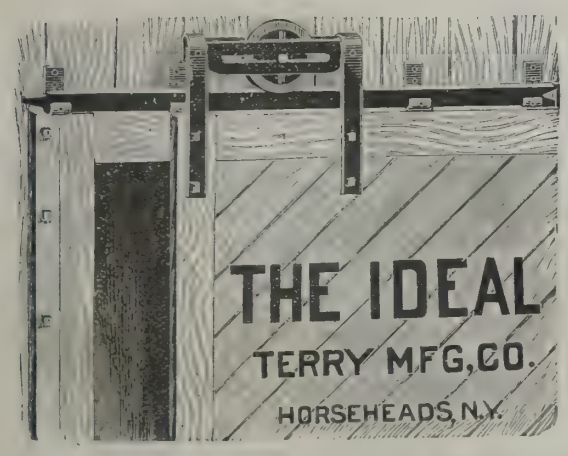
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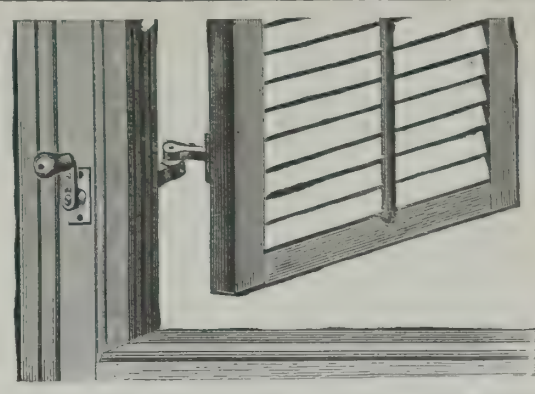
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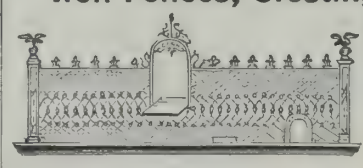
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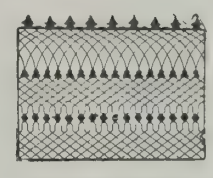
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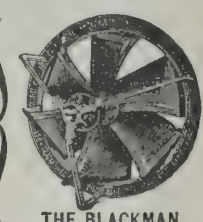
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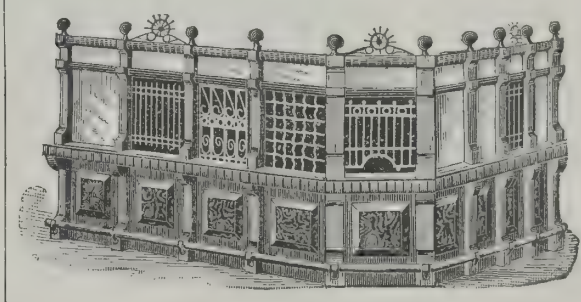
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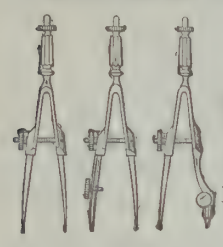
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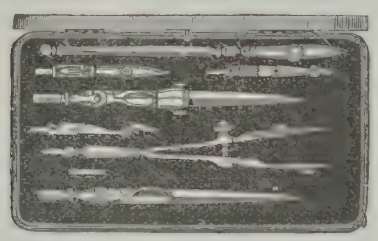
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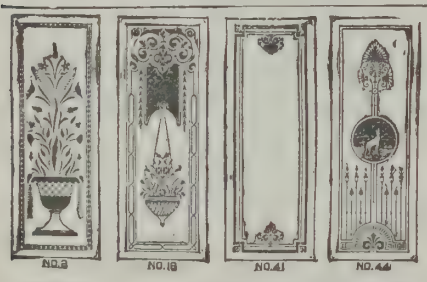
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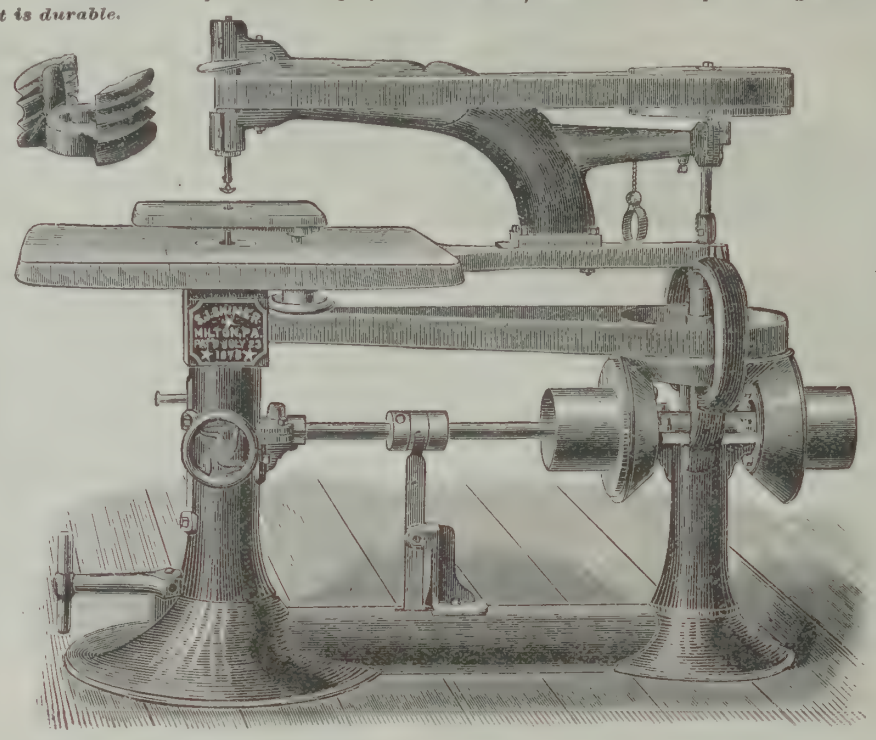


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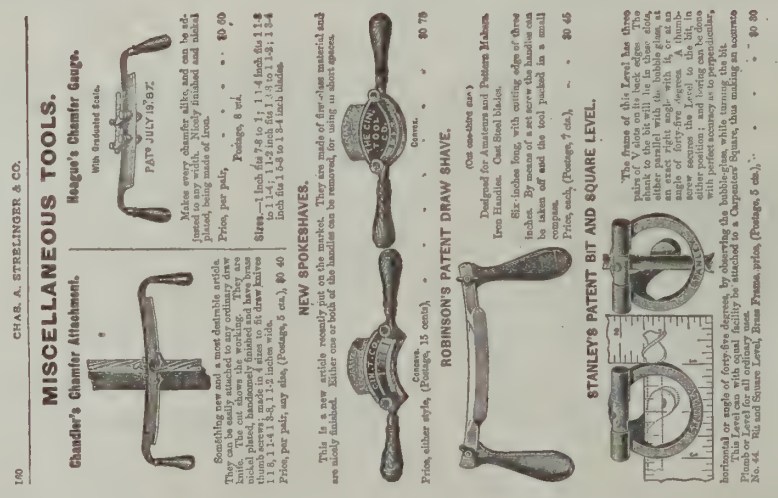
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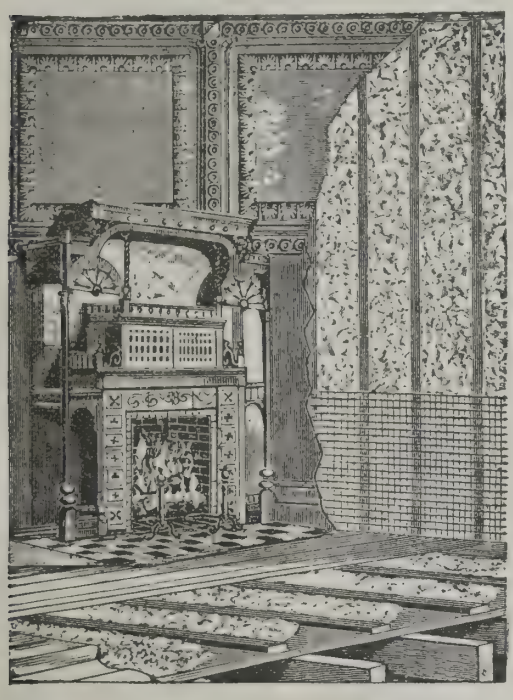
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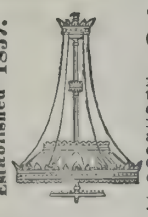
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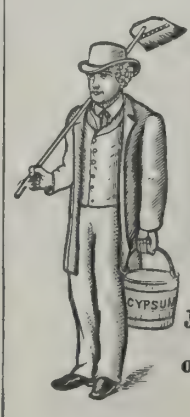
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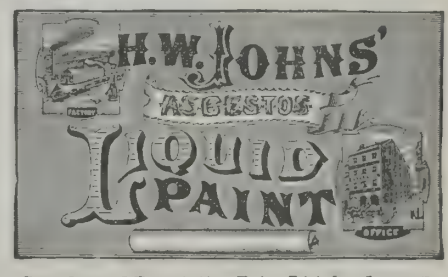
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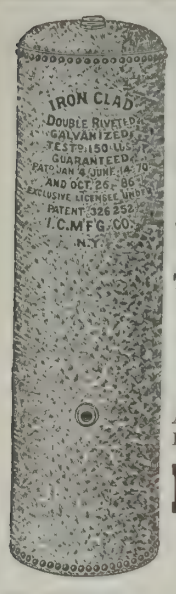


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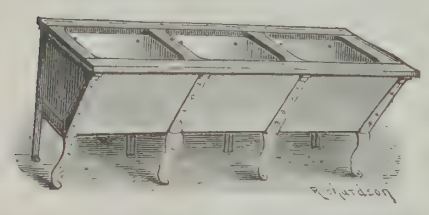
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Notes and Queries.

(1) J. C. O. asks (1) for a non-odorous disinfectant; is there any cheaper or better than common copperas dissolved in hot water? A. The advantage of copperas is that it is not highly poisonous; the disadvantage is that it stains tissues, and under some conditions even porcelain. It is very efficacious. Sulphate of zinc probably surpasses it, but is poisonous. 2. What are the ingredients used in the solution for dipping old brass fixtures or ornamental brass work or chandeliers, etc., to make them look clean? A. Wash with beer. Dipping in acid is not applicable except where they are to be relacquered, etc.

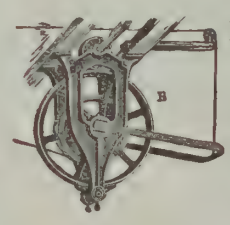
(2) W. P. S. asks: What will take away the bad smell from the water in a cistern without making it unfit for washing purposes? A. Possibly suspending a bag full of charcoal in it may answer. A little permanganate of potash may do good. In this case, if enough is added to produce a pink color, it will stain the clothes.

(3) G. B. asks (1) if there is a difference between mineral wool and asbestos. If so, what is it? A. Mineral wool is made artificially by blowing melted slag or glass into threads by steam. Asbestos is a natural mineral. 2. What is the liquid used by the so called "fire eaters," that they use on their hands before handling red hot irons, etc.? A. Dilute sulphuric acid or very strong solution of alum. Your other query will be answered later.

(4) V. H. asks: Can cement be softened or loosened from the joints of terra cotta sewer pipe, without breaking the pipe? If so, how? A. No. 2. What is the average width across the shoulders of a man? A. It depends on the race. 3. What is the average length of a man's arms? A. About 6 feet from hand to hand when extended. This also depends on the race. 4. Can a person that is deaf in one ear hear a phonograph? And if so, how would you arrange it? A. Yes; no special arrangement is needed. 5. How can candle grease spots be taken out of soft woolly cloth? A. Scrape off all that will come. Then place a piece of blotting paper over them and iron with a hot iron. 6. Do you recommend a trade school to learn a trade in, or the ordinary way of apprenticing, for the time it takes to learn it? A. The trade school.

(5) W. S. H. asks if there is any way to varnish or coat a copper boiler in the kitchen, connected with a range, so as to keep it bright and avoid the weekly scouring and the use of so much "elbow grease"? A. Shellacking or the application of gum sandarac varnish might answer. For all these applications the surface must be absolutely clean.

(6) W. S. asks where to get a good book on plumbing. A. "Standard Practical Plumbing," by Davis, $3; also Clark's "Plumbing Practice," $3.



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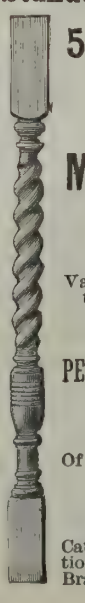
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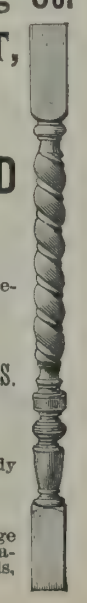


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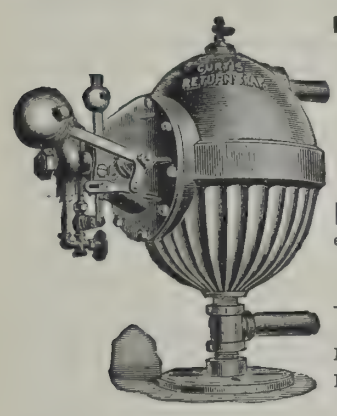
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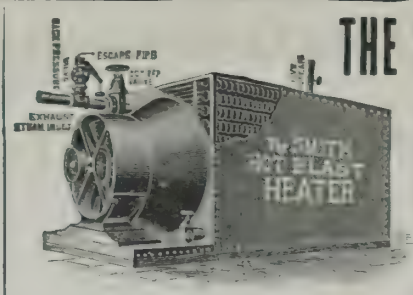
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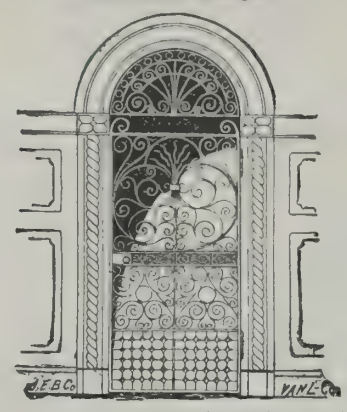
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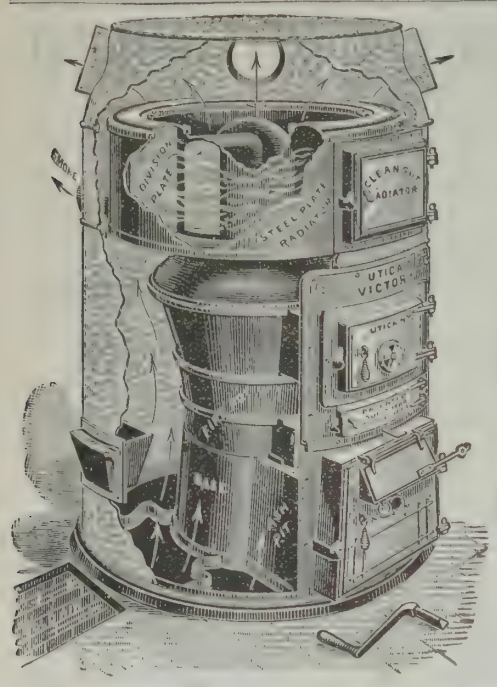


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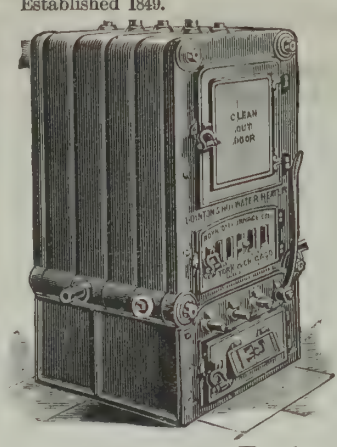
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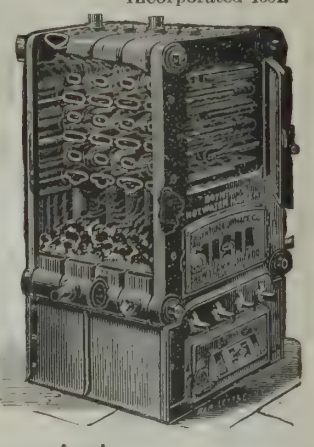
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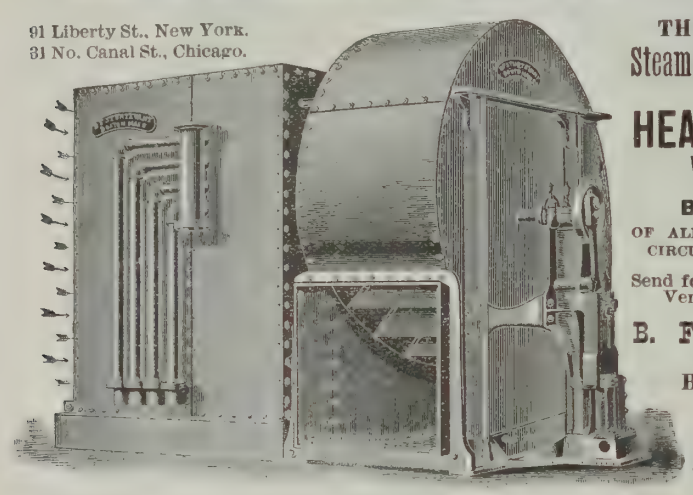
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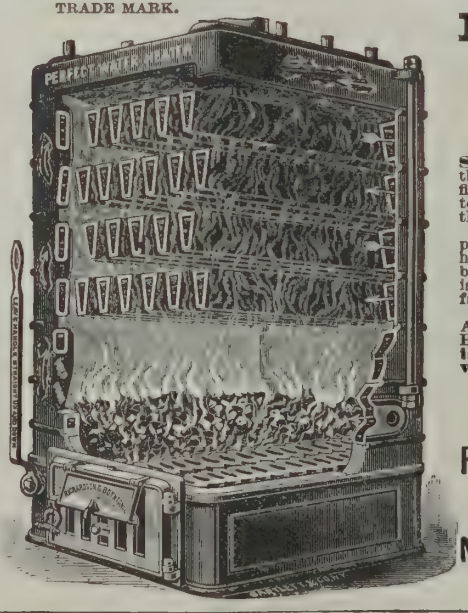
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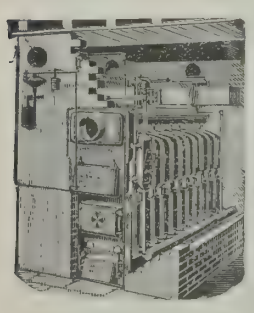
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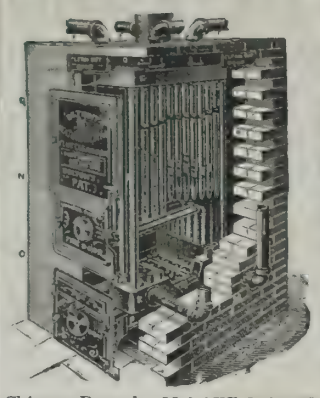
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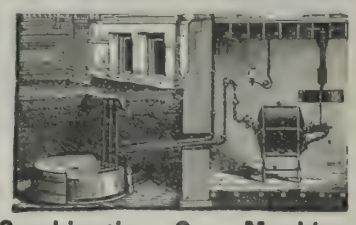
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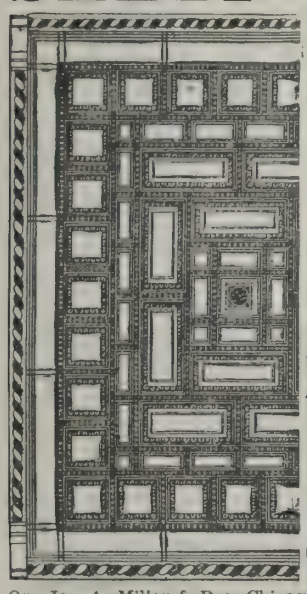


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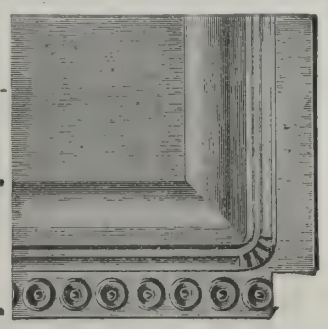
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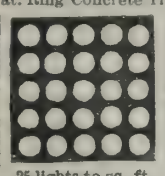
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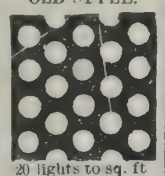


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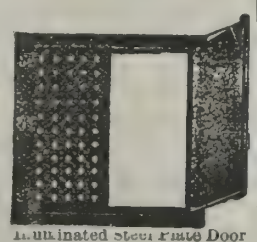
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Illuminated Steel Plate Door

MARSTON'S IMPROVED

Hand and Foot Power Band Saw.

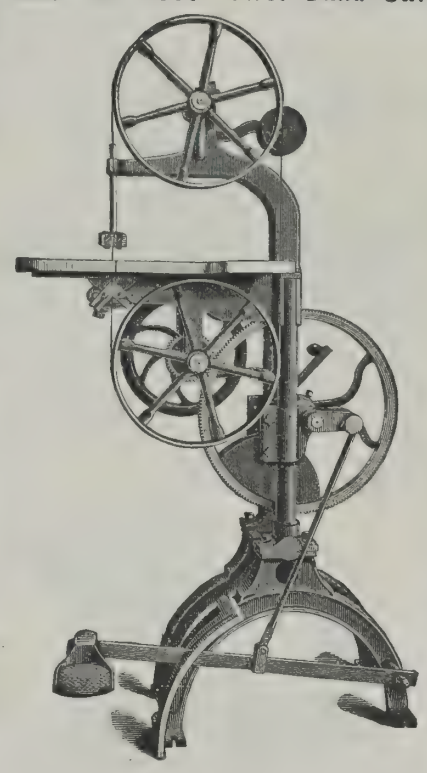
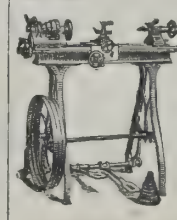


Table is 3 feet 6 inches from floor; measure 18 x 21 inches; is adjustable for cutting on a bevel. Guide for saw both above and below table. Distance from table to guide when raised its full height, 5 inches; 16 inches between saw and frame. All gears cut from solid iron. Shafts are made of steel. Saw pulleys covered with rubber. Upper saw pulley has adjustment to bring it into line with lower saw pulley. Weight of machine, 260 lbs. Machines on trial.

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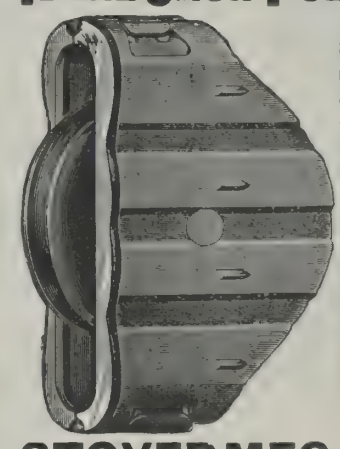


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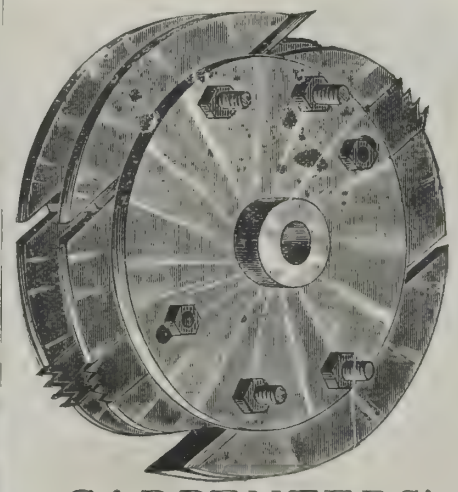


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COMBINED
Storm and Screen
DOOR.
Pat. APRIL 6, 1886.
Pat. JULY 12, 1887.

The device is cheap, simple and effective, easily put up and easily removed. Any screen door is quickly made into a perfect storm door at little expense by inserting the panels, and all trouble of taking down the screen door, or damage to same while stored is avoided. Lyle's screen door, ready for storm panels, costs but little more than old style door, and will pay for itself in one winter if you put in panels. Buy no other.

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ADJUSTABLE.
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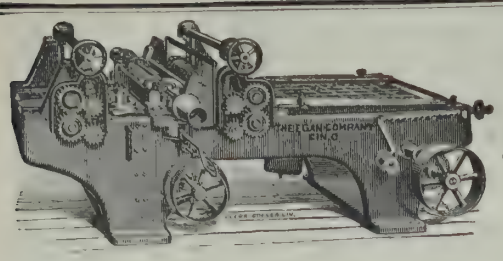
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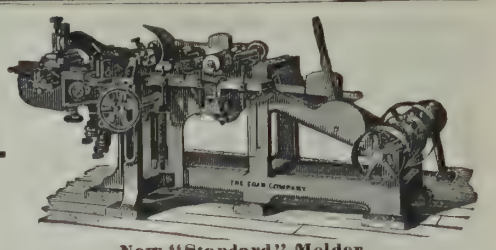
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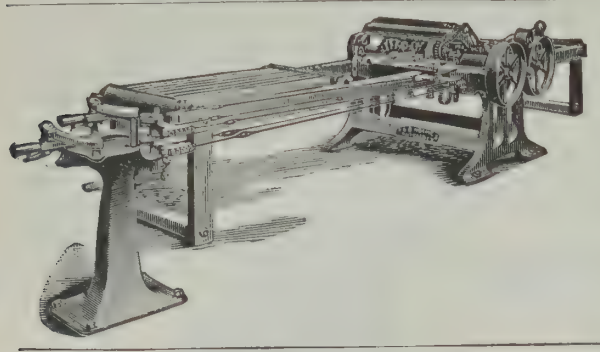
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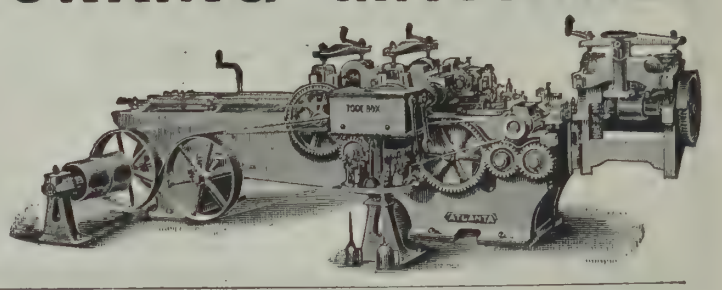
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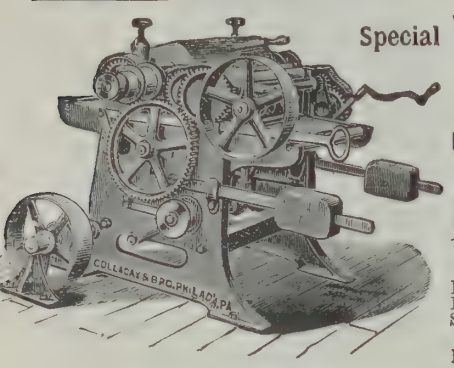
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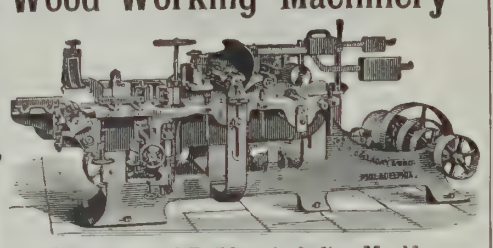
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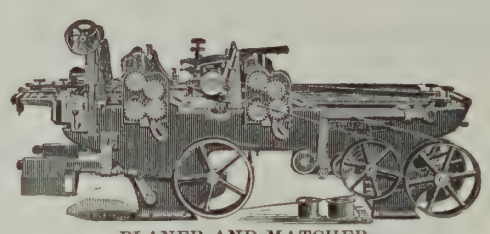
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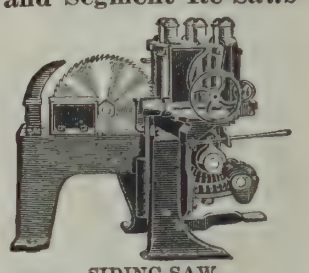
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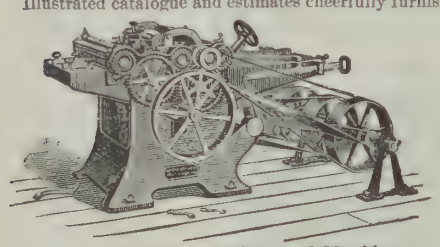
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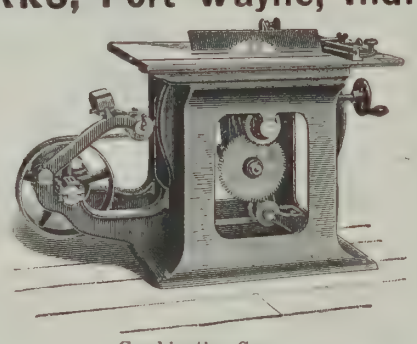
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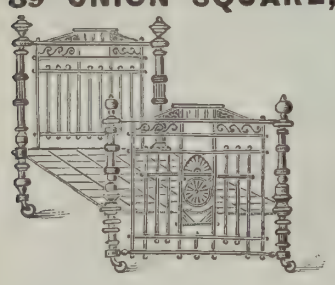
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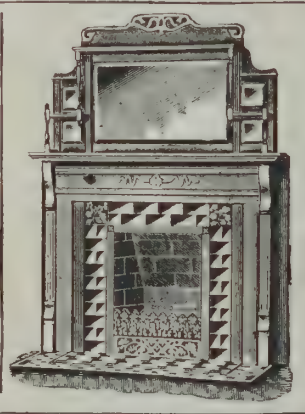
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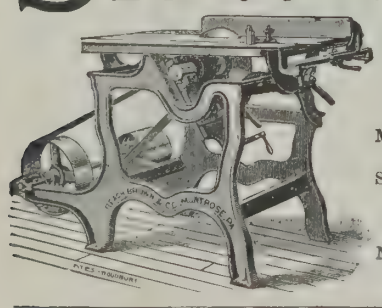
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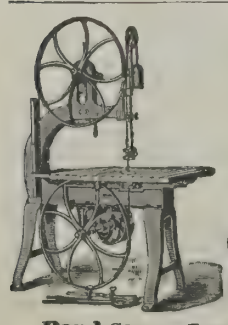
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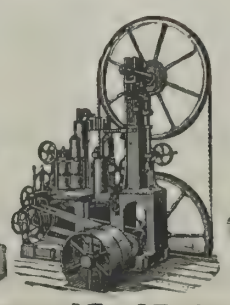
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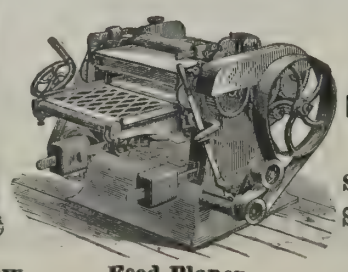
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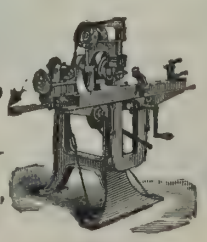
Band Saw.



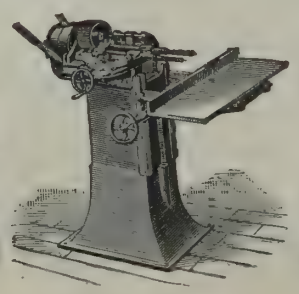
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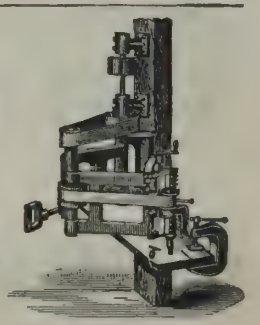
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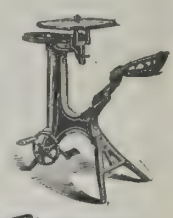


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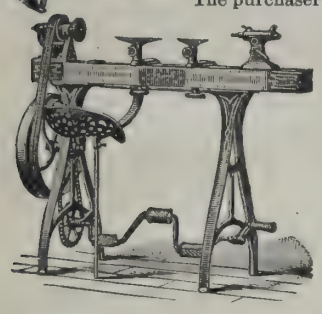
The purchaser can take the complete outfit, or only one or more machines, at a time, as his requirements may demand.



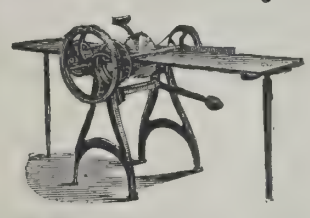
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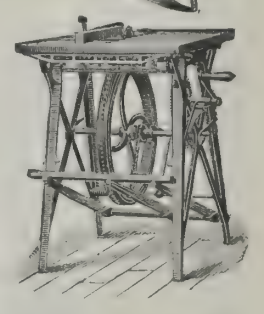
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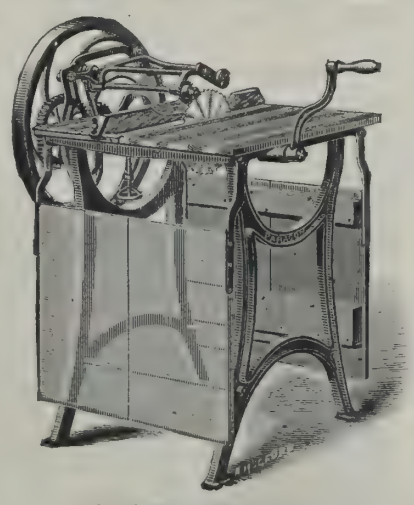


Has powerful treadle motion, cuts rapidly and is easy to operate. Can be arranged for steam power if desired. Weight, 230 lbs.; boxed, 340 lbs.

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Has upper and lower spindles, adjustable tension spring, dust blower, drill, tilting table, etc. Suitable for close and very accurate work. Cuts up to 3 inches thick; swings 24 inches.

PRICE, with 12 Saw Blades, **$40.**



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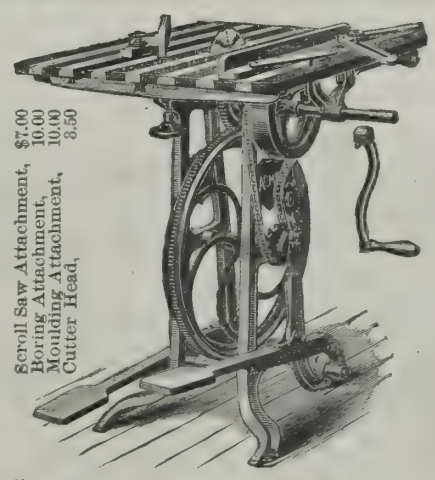
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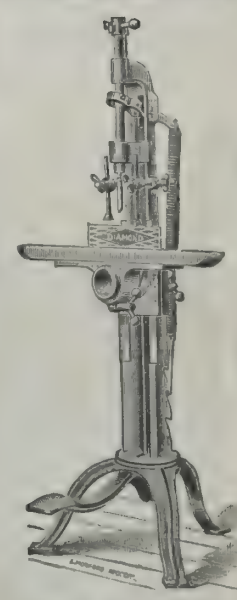
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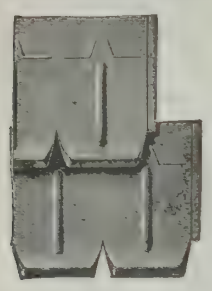


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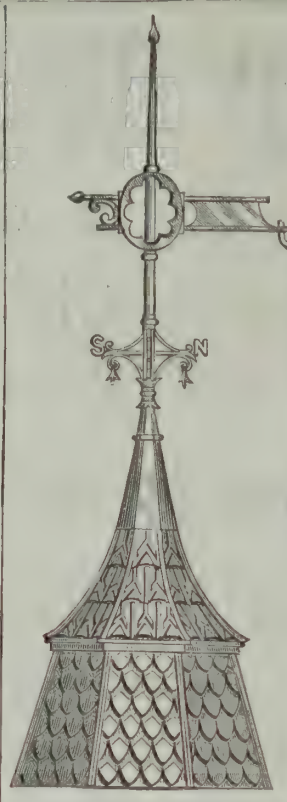
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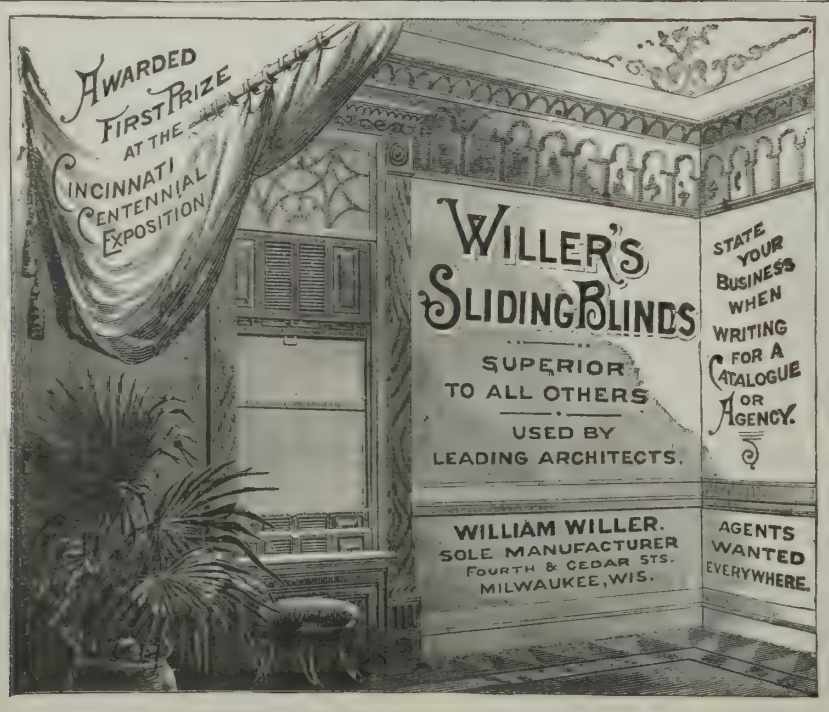
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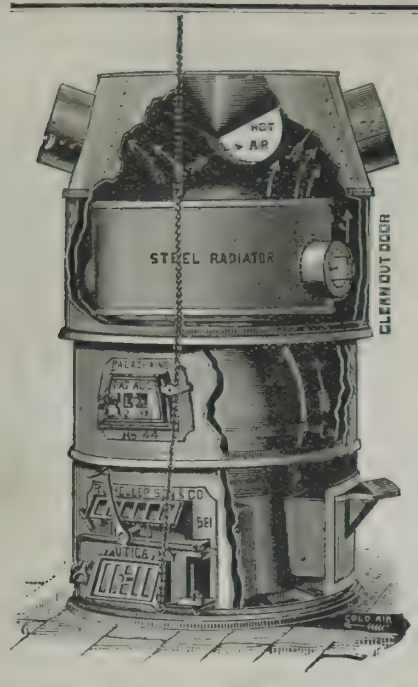
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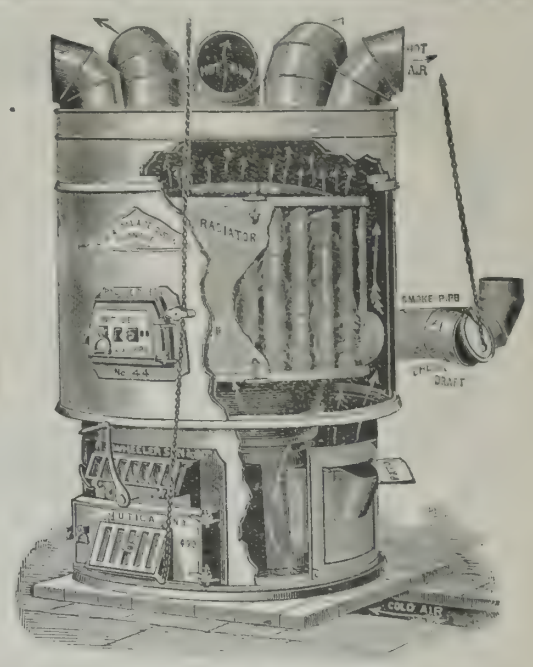


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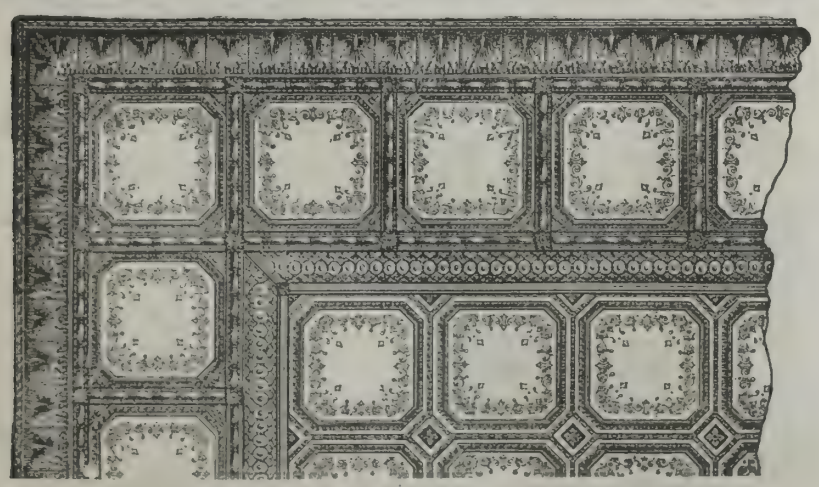
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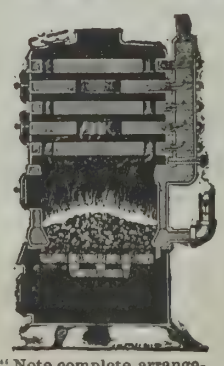
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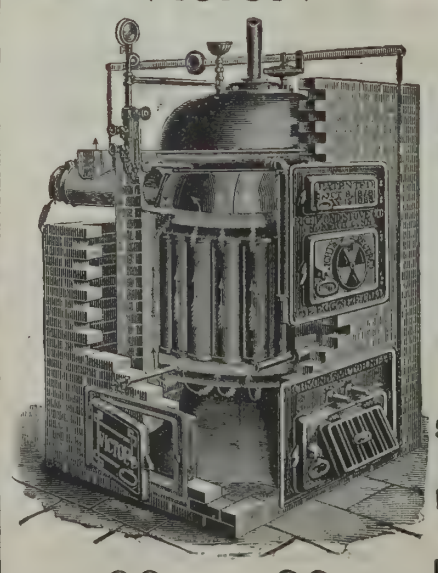
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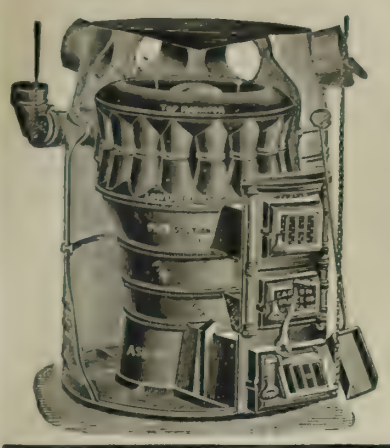
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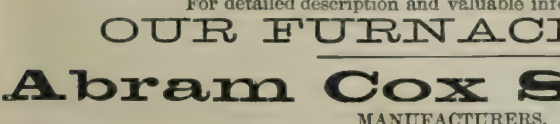
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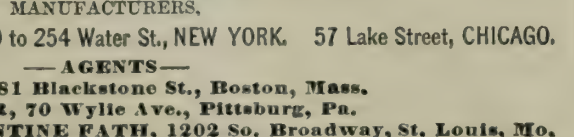
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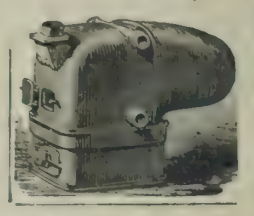
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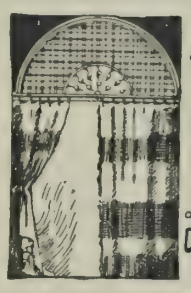
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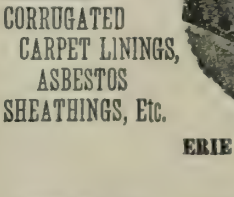
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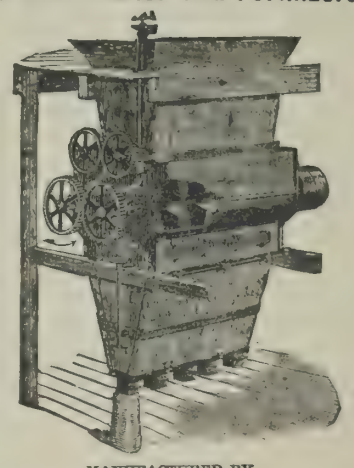
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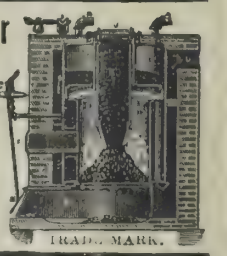
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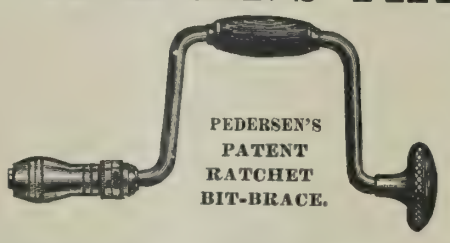
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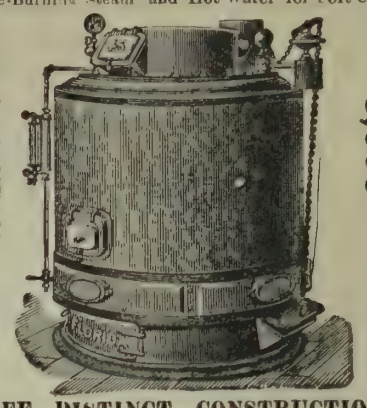
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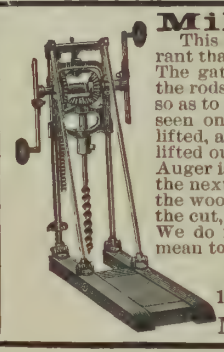


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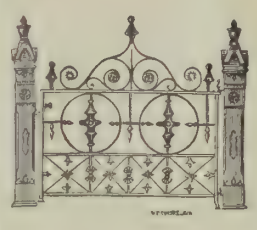
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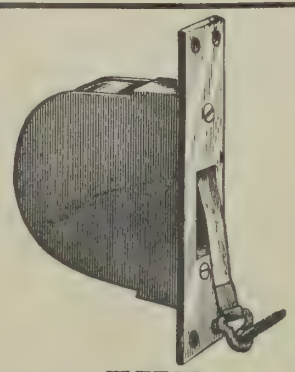
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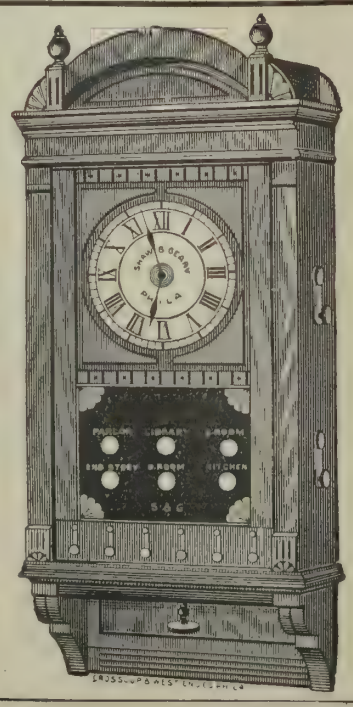


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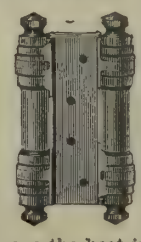
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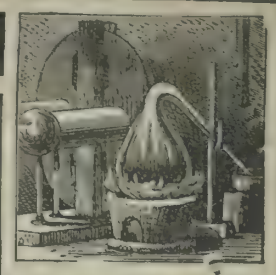
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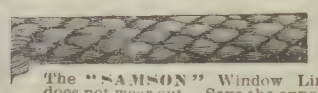
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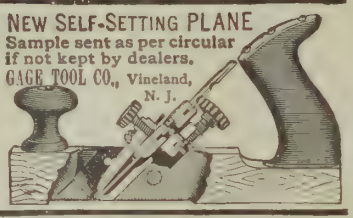
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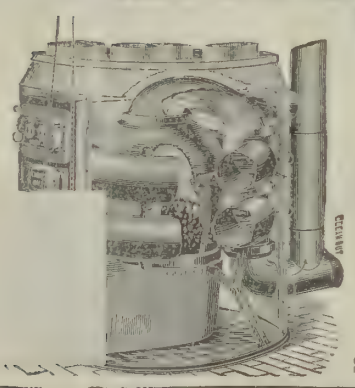


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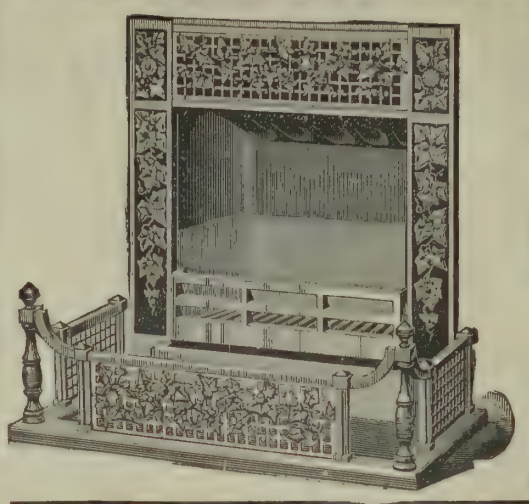
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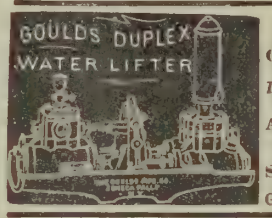
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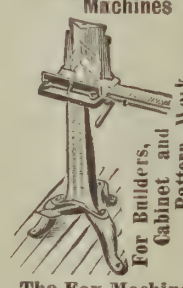
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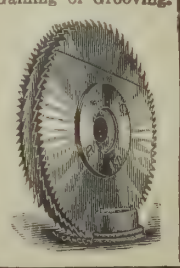
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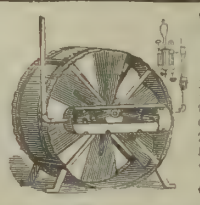
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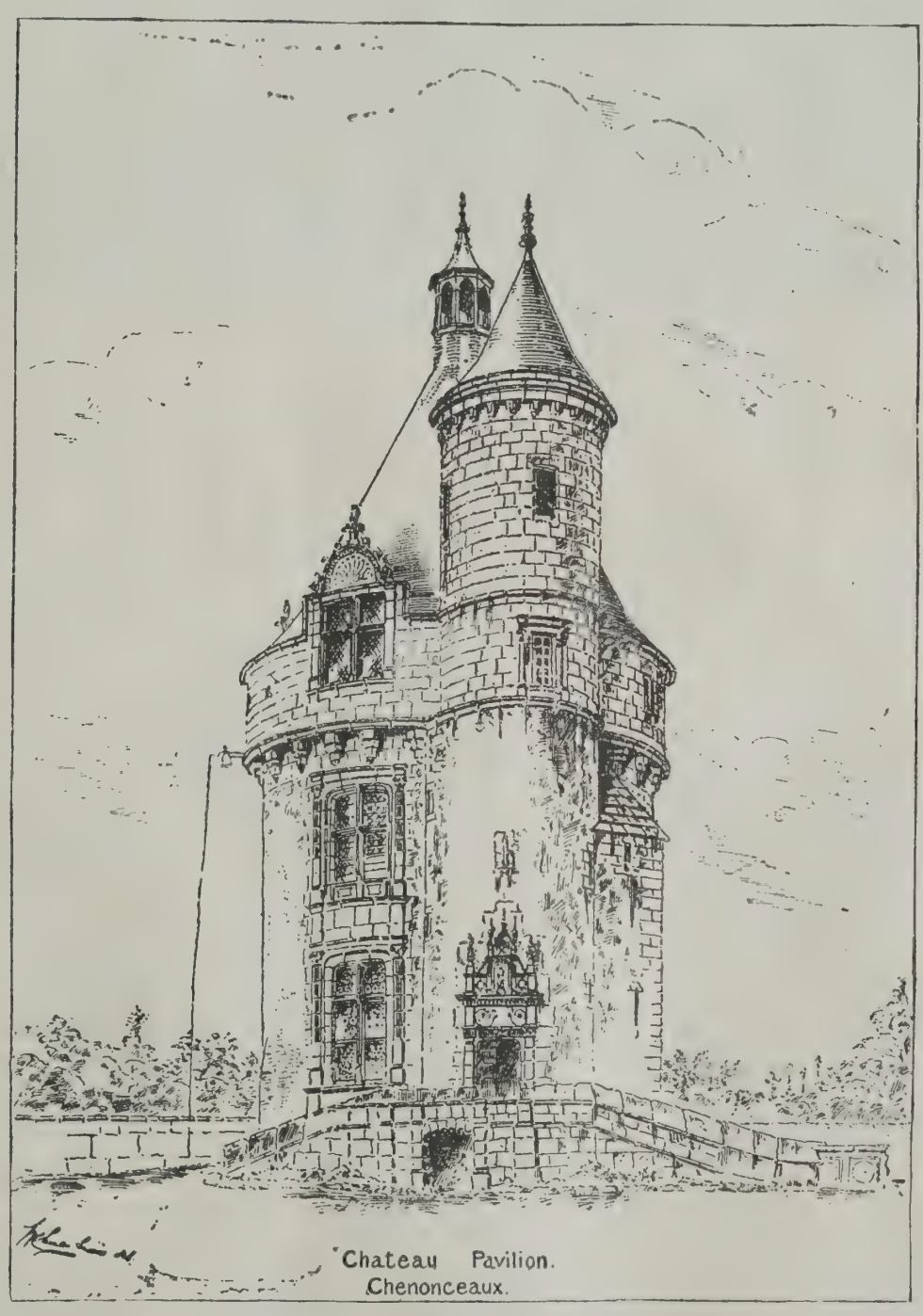
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Chateau Pavilion.
Chenonceaux.

[For description see page 20.]

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CHATEAU DE CHENONCEAUX.

This fine chateau—see illustration, page 19—was erected in the reign of Francis the First. Although castellated in form, it is not a true castle, being evidently intended, not for defense, but for residence in an agreeable situation. It was begun in 1515, and stands in a pleasant country, about fifteen miles from Tours. The village of Chénonceaux has a station on the railway from Tours to Vierzon. Of the chateau, the main edifice is on the right bank of the Cher; but part of it is built on piles over the stream. The treatment is Italian, highly ornamented. There is but one tower, shown in our sketch. The chateau retains still its sixteenth century character; both externally and in its furniture it has undergone scarcely any change since its erection. Within recent years it has been carefully restored after the original design. There is a Gothic chapel with fine painted glass It was given by Henry II. to his favorite, Diana of Poitiers; but her rival, Catherine de Medicis, dispossessed her of it after the death of the king, and made of it a residence for herself. Her bed room, with its original furniture, is still shown. It was long the property of the Princes of Condé. In the eighteenth century it became a great center of men of letters, under the auspices of Madame Dupin, a wealthy patroness of literature. Eminent men like Voltaire, Rousseau, our own Bolingbroke, and many others, were frequent visitors. There is a fine collection of paintings, chiefly portraits. The castle is shown to visitors. In the little theater Rousseau's opera, "Le Devin du Village," was performed for the first time.—*Building World.*

A COTTAGE FOR $900.

One of our colored plates this month shows the perspective and floor plans of an attractive little cottage, recently erected at a cost of only $900, at Sunapee, N. H., by W. W. Eastman, Esq., from plans by Munn & Co., architects, New York. The exterior is pleasing, and the general interior arrangement complete and satisfactory. The cottage is much admired, and has been extensively copied. It is seldom that so tasteful a house for so small a sum is realized. On page 33 we give a sheet of details which will prove convenient to builders.

Our plate was prepared direct from a photograph of the building kindly furnished to the SCIENTIFIC AMERICAN by the owner.

MR. CHARLES BARNARD'S COTTAGE, STAMFORD, CONN.

One of the most interesting examples of a small dwelling house that combines convenience with a certain amount of artistic effect is the new cottage built for Charles Barnard, at Stamford, Conn., which forms the subject of one of our colored plates in the present number. The following description is from the *Art Amateur:* The building is nearly square, measuring 25×33 ft., with an overhanging roof that covers a piazza which is 8 ft. wide and is placed on the south side. The corner posts are only 16 ft. high, which gives 9 ft. for the first story and 6 ft. for the upright portion of the upper story. The upper rooms all show the slope of the roof, but the ceilings at the walls are sufficiently high to give all the head room required. So far the building is entirely plain, and, of course, very inexpensive. To give an artistic character to the house all the windows on the west (or street) side and the south and north sides are very large, and are composed of a single sheet of fine quality of Belgium glass. None of these windows opens, and to give air to the house each window is provided with a transom. The windows on the west side measure 5×4 ft., and the others are a few inches smaller. The front door on the south side is a "Dutch door," the upper half being filled with stained glass. On the second floor a large dormer extends over the piazza. The window is 11×5 ft., and has three large pieces of glass and three transoms. On the west side is a "loggia" or covered balcony, with French windows, the hipped roof forming a hood over the balcony. To increase the effect of massiveness the house is placed close to the ground, and the two chimneys are made very large and heavy, while the piazza posts are solid pieces of timber, measuring 8×8 in.

The roof and upper story are shingled and stained dark red and yellow, with very dark olive trimmings, while the lower story is clapboarded and painted a light yellow. The interior is laid out with the utmost simplicity and with as few partitions as possible. The lower story is practically only one room. The front door opens directly into the main room of the house, and the stairway ascends from the center of the same room This room measures 12½×33 ft., including an archway that opens into a "cozy corner." The chimney, 6 ft. wide, occupies the center of the western half of the house, there being wide arches on either side of the chimney breast. The dining room is on the north of the chimney, curtains on either side of the latter separating it from the parlor.

Upstairs there are three chambers and a library that extends over the piazza, having a window on the south side 11 ft. wide. Between two of the chambers is a small bathroom. All the rooms are perfectly plain, the artistic effect being obtained by the use of simple colors. The woodwork throughout the house is painted in pale yellow, or about the color of old ivory. The parlor is papered with pale yellow cartridge paper, with a yellow gold ceiling, and the curtains are in another shade of yellow. The cozy corner is papered with very dark blue cartridge paper on the walls and a brilliant yellow in arabesque patterns on the ceiling, the ceiling color being carried down on each of the walls to a distance of three feet. The dining room is in Pompeian red, with an indistinct figure in a different shade. The library is in piush Pompeian red cartridge paper, with very pale yellow ceiling in a Japanese paper. The chambers are all papered in small patterns, the paper covering both walls and ceilings. All the transoms over the windows on both floors are in solid masses of color, the effect being obtained by glazing with whole pieces of opalescent glass. The glass was selected at the factory with the greatest care, and the effects obtained are produced by the mingling of two or more colors in one piece of glass. No leaded design is used, and the effects are due simply to the mass of mingled colors. Each window is thus a suggestive bit of color harmonizing with the wall colors, the transoms in the parlor being in shades of blue and white, in contrast to its yellow walls. The effect of so much brilliant color on walls, ceilings and in the windows is to give the rooms a warm and attractive appearance, while the great windows, free from sash bars, fill the rooms with light. The effect of looking out on the landscape is precisely like that of looking at a picture through a massive picture frame.

There are four open fireplaces, two on each floor, and all are in metal of artistic design Two of the fireplaces are in nickel or dull silver color, one in black iron and one in bronze. The hearths are of encaustic tiles of the same color as the walls in each room, and are fitted with brass or wrought iron fenders, according to the color of the fireplaces. The house is warmed by a hot air furnace, and the kitchen is fitted with a complete gas range and gas water heater. The bathroom is also supplied with a gas water heater, there being no range, water back, or hot water boiler. In practice the exclusive use of gas for cooking and for heating water is cheaper to begin with, and the cost afterward is about the same as that of coal, while there is a very great saving in labor by getting rid of dust and ashes and the handling of coal. No gas is used for lights, except in the hall, bathroom and kitchen, lamps being used until electricity can be supplied.

The house costs when finished—three coats of paint being given—about $2,000. This does not include water works, gas apparatus or furnace. The cost of the stained glass is about $70 more, and the furniture, rugs, etc., are extra. No upholstered furniture is used, all the furniture being of wood, either in the natural color or painted. The parlor set is of the plainest description, and is of wood painted in old ivory white, trimmed with dull gold red, with dark gold plush cushions. All the curtains are in "shadow silks."

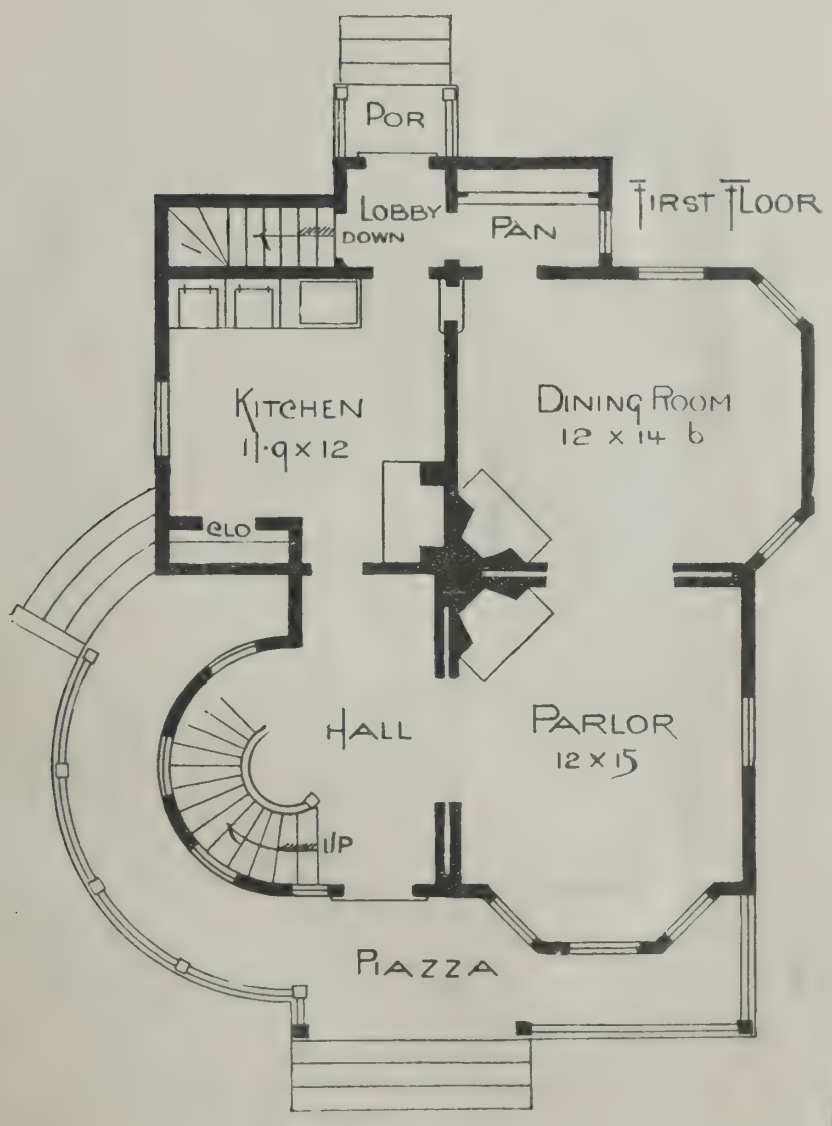
Our plate was prepared direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN. On page 29 we give a sheet of details which the builder will appreciate.

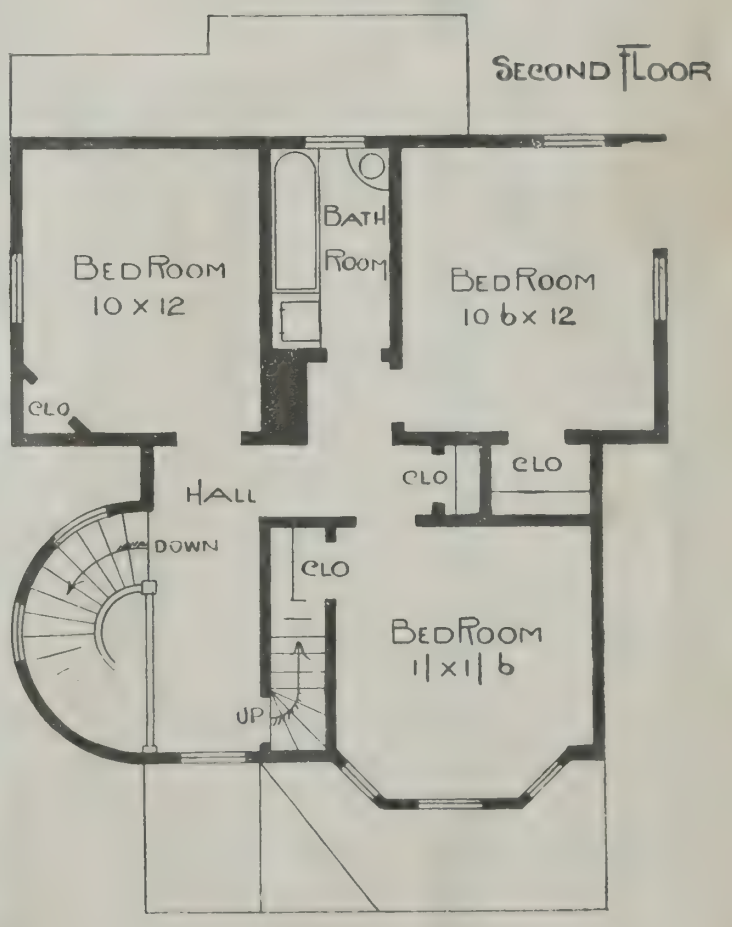
Steam as a Fire Extinguisher.

The use of steam as a means of extinguishing fire is not new, and its advantages in point of convenience and, for that matter, of efficiency over many other commonly practiced methods have frequently been given prominence. There have, however, been cases where the method has failed completely, and much damage and disappointment has resulted, leading eventually to serious questioning whether steam really deserved all the praises bestowed upon it as a fire extinguisher. It will, therefore, not be amiss, says *The Engineering and Building Record*, to direct attention to the very important circumstance that the conditions essential to the success of the method are occasionally wholly ignored, and, in cases of failure to act efficiently, the causes are generally not difficult to find.

The prime requisite of success is that the space in which the fire is burning should be inclosed so that free access of air is cut off, and steam under pressure and in ample quantity can be let into the apartment. It must be borne in mind that the efficiency of the steam in extinguishing fire is due simply to the fact that the vapor displaces the air and, with it, the supporter of combustion, atmospheric oxygen. If this circumstance were given due thought, there would be less disappointment and fewer heavy losses where steam jets are depended upon for fire protection. A few years ago, we believe, reports of experience in Germany with the steam jet method recorded decidedly unsatisfactory results, and inquiries were frequent as to the exact conditions under which it was practiced in mills in this country where it was known to have rendered excellent service. The whole secret of success, however, if such it can be called, is in the correct application of the simple principle we have stated.



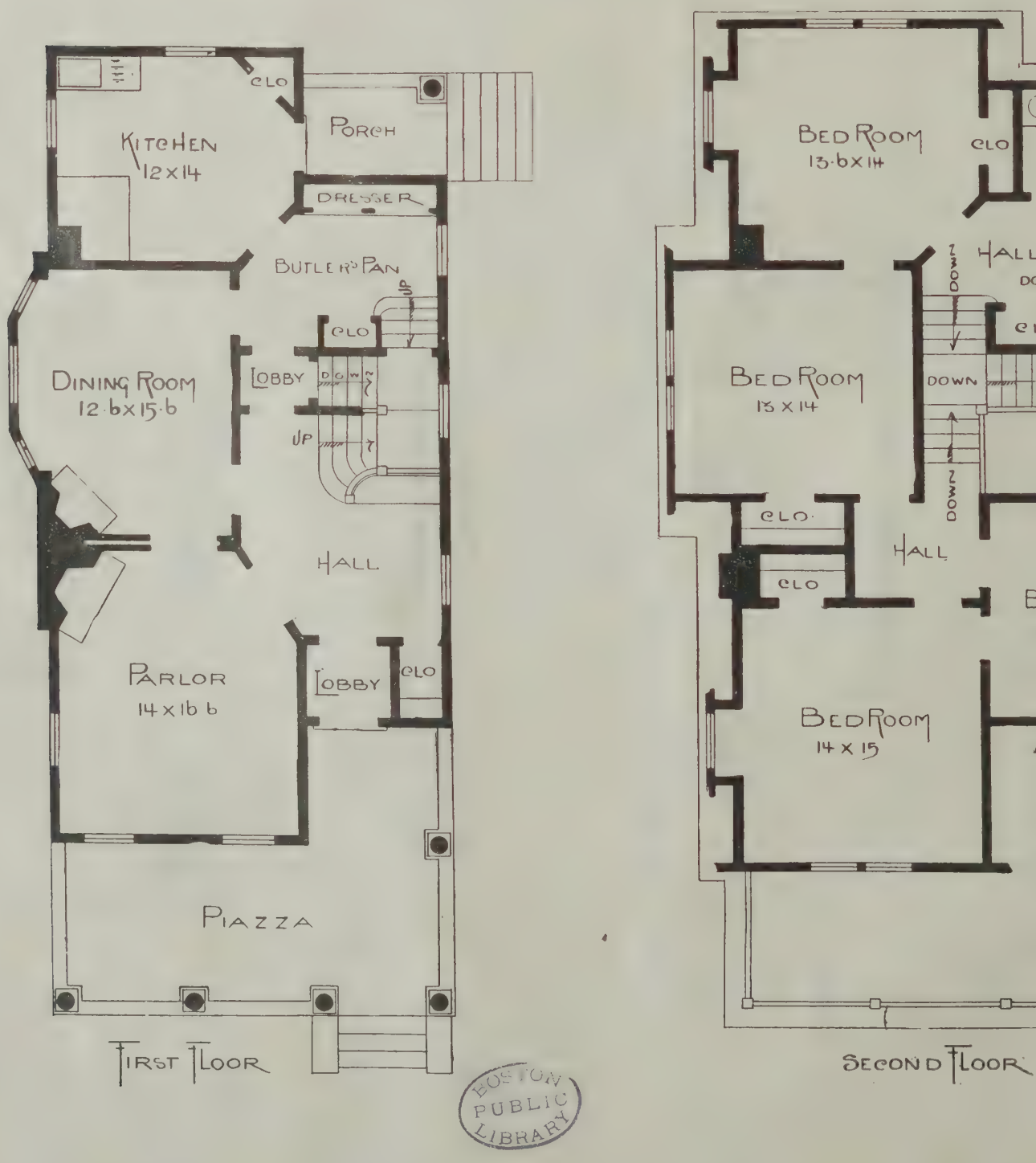




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A COTTAGE IN VILLA PARK—[See page 28.]

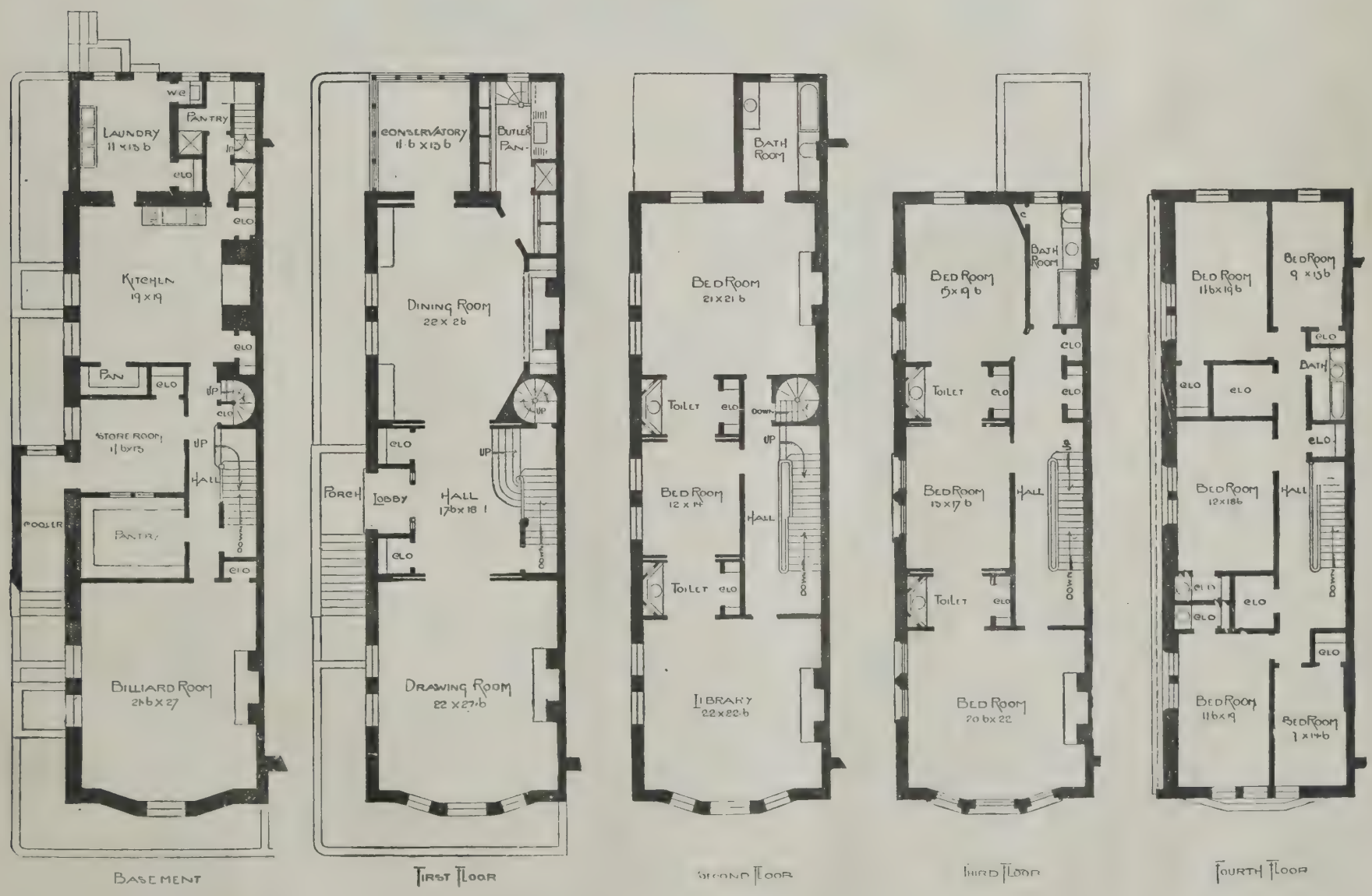




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A RESIDENCE ON CHESTER HILL.—[See page 28.]





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HOUSES ON WEST END AVENUE, NEW YORK.—[See page 28.]

THE FESTIVAL HALL OF THE UNION OF GERMAN SINGERS.

The Union of German Singers having decided to hold its fourth festival at Vienna during the course of next year, the committee on organization put up for competition the plan and execution of a festival hall capable of holding 20,000 people.

Of the six projects presented, that of Mr. Hermann Otte, an architect and master builder of the city of Vienna, was adopted, and the carrying of it out was awarded to its author at the price of 65,662 florins ($32,426), the materials to remain the property of the contractor. See illustrations.

The monumental aspect of this structure, compared with the low price at which it was contracted for, has seemed to us to merit a certain interest, and we have reproduced a general view and the details of it, along with the following description, from the *Journal of the Austrian Engineers and Architects.*

As the plan shows, the hall forms a half circle at each extremty. It is 380 feet in length, 183 in width, and 73 in height. Its framework is formed of a combination of plank arches resting upon piles, without any intermediate bearing point.

By reason of the wide surface occupied by the structure, forty-five exits are distributed throughout the circumference of the hall. Besides, the gallery gives access to a balcony, 13 feet in width, that surrounds the entire hall, and from which 10-foot-wide staircases lead to the grounds about the hall.

The singers' seats, capable of accommodating 8,000 persons, rise in rows one above another on three sides of the leader's stand. Beneath the seats there is a buffet designed especially for the singers.

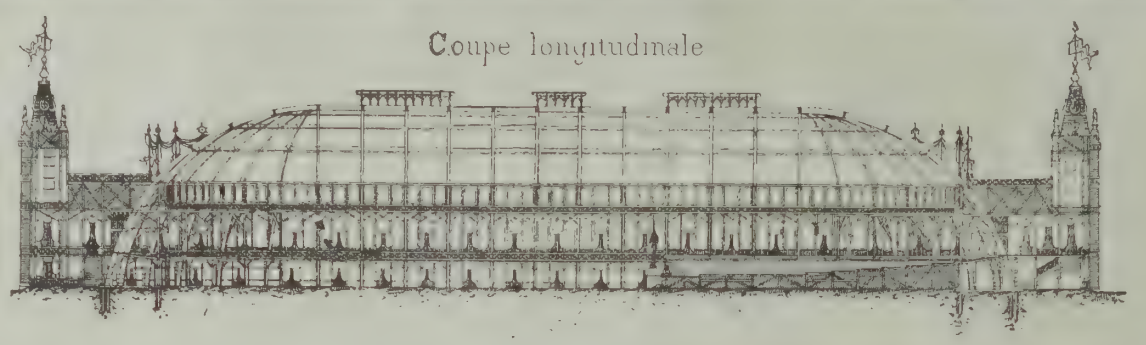
The dressing rooms are at the three main entrances, and the water closets are outside, in annexes connected with the hall by a passageway.

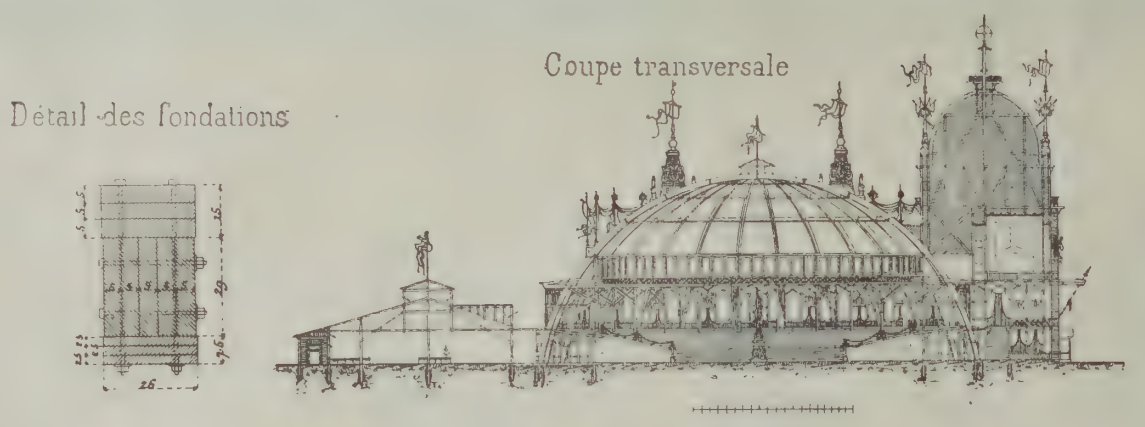
Opposite the main entrance of the front will be installed the orchestra that is to fill up the interludes. The banners of the various choral societies participating in the festival will be arranged all around the hall above the spectators' gallery.

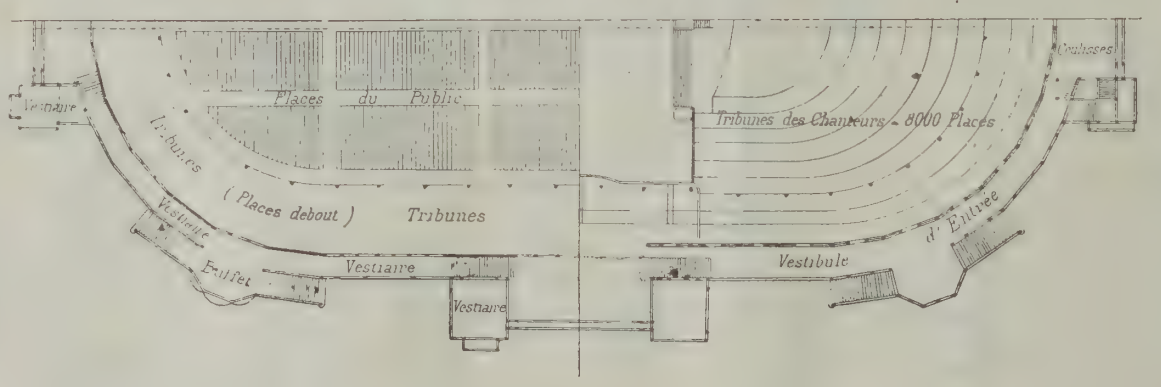
The light enters through large lateral openings, with white hangings to diminish the brightness of the sunlight. Ventilation is effected through the top of the hall.

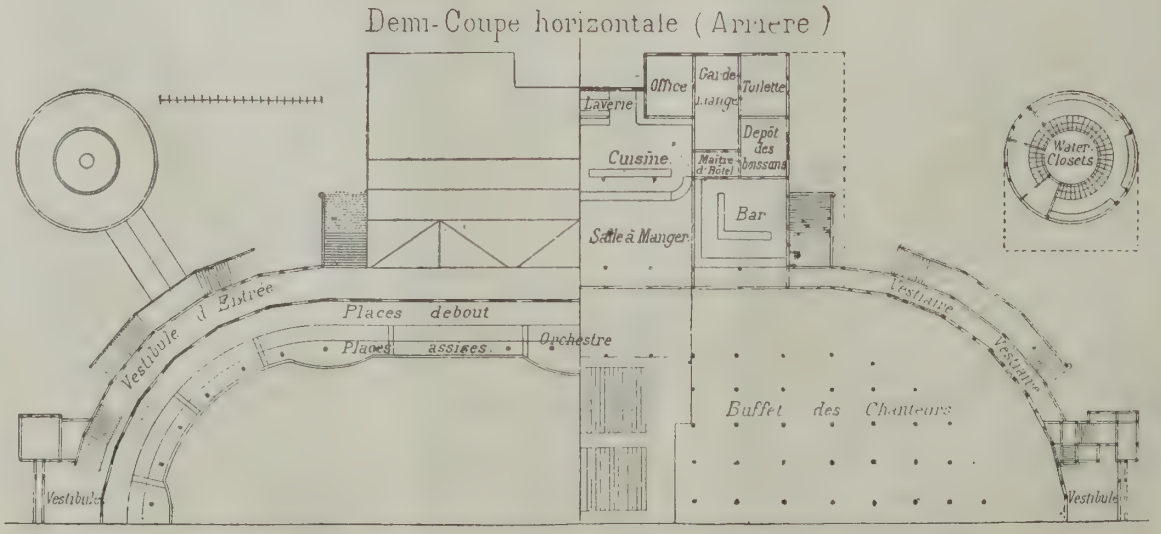
The chambers for medical aid, the office of the commissary of police, the fire service, the guard corps, the office of the committee on organization, and that of post offices and telegraphs are installed in two small annexes.











FESTIVAL HALL OF THE UNION OF GERMAN SINGERS.

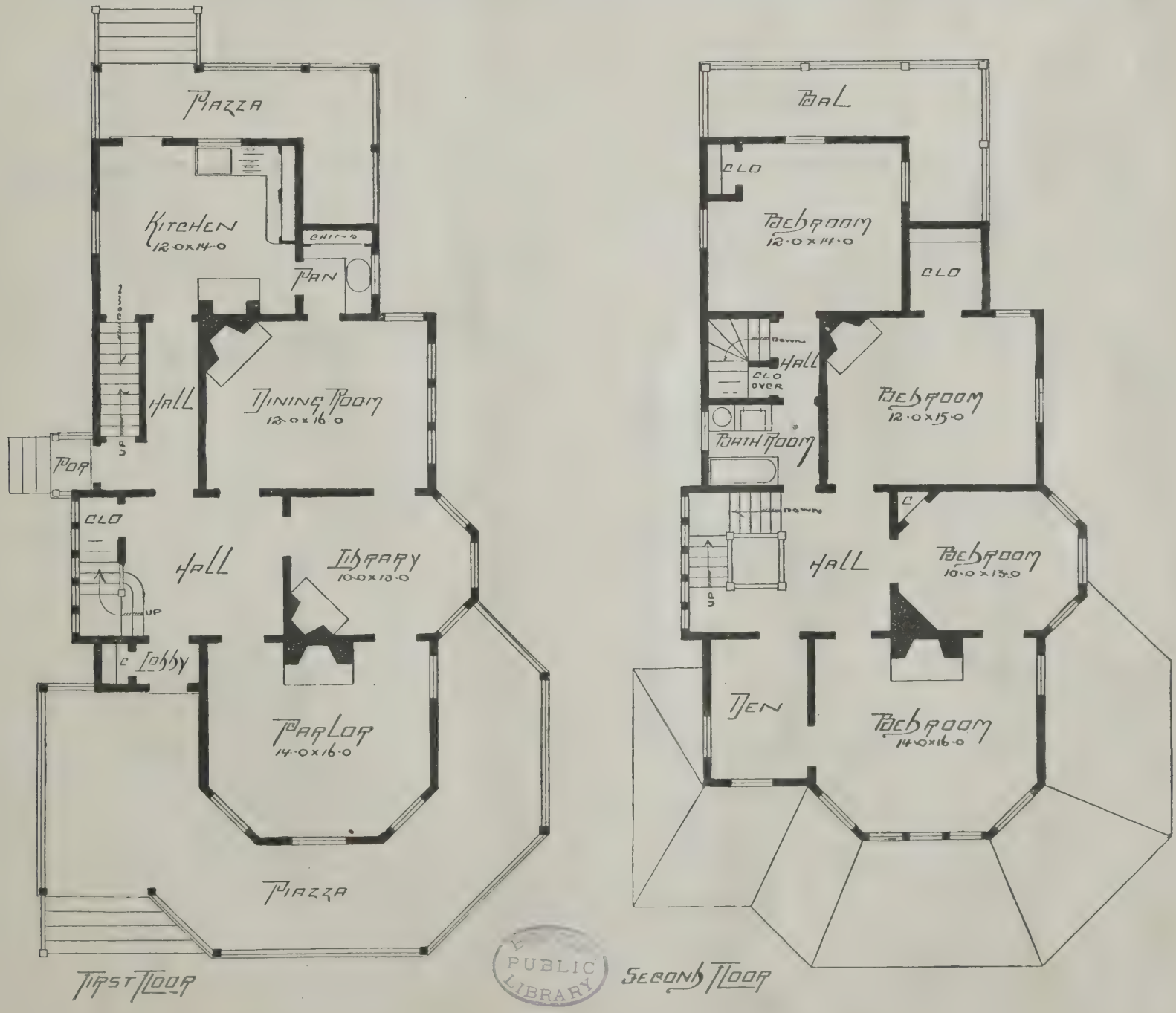
The grounds of the festival are closed on three sides by board fences, and on the fourth side by a picket fence, in the center of which is an entrance for carriages, and twelve wickets for the collection of entrance money. The hall and the grounds will be lighted with electricity.—*Le Genie Civil.*

Trees and Streets.

The answer recently given in the Boston *Transcript* to a correspondent who had asked, "What are the legal rights of owners of trees abutting streets and sidewalks?" may be of interest to others.

According to the *Transcript*, in the State of Massachusetts at least, "a street is simply a strip of land set aside for the common good—a highway over which every one has a right to pass. But the public does not own it; it has simply the right of way over it. The fee usually belongs to the owners of the abutting land, who have a right to make any use of the land within the limits of the street which does not interfere with the public's right of way. For instance, the owner of the fee may cut the grass growing by the roadside, gather the fruit growing upon trees within the limits of the highway—the trees are his property. For public convenience towns and cities are required to keep all public highways within their limits in a condition that shall insure the safety and convenience of people lawfully traveling thereon. Cities and towns have no further rights or authority in the streets and highways than simply to discharge the duty imposed upon them by law to make and keep in repair the surface of the street and to remove anything which obstructs travel or renders it unsafe." A passage from the public statutes is then cited which declares that municipal officers may grant permission to retain or to plant trees on the highways in proper positions, that they shall be considered the private property of those who plant them, but that, if complained of and proved to be nuisances, their removal at the owner's expense may be ordered. In 1867 a suit was brought against a superintendent of streets in Bristol county for allowing the branches of a tree on the highway abutting the plaintiff's land to be cut to permit the moving of an engine house. The verdict was given for the plaintiff, and the court remarked: "This enactment has limited in an important manner the powers of highway surveyors. Shade trees are no longer liable to be treated as a nuisance and lopped or cut down at the discretion of every such officer. They are private property, to the ornament and shelter of which the owner of an adjacent estate is entitled, and they cannot be interfered with except upon due process of law, as marked out in the statute."

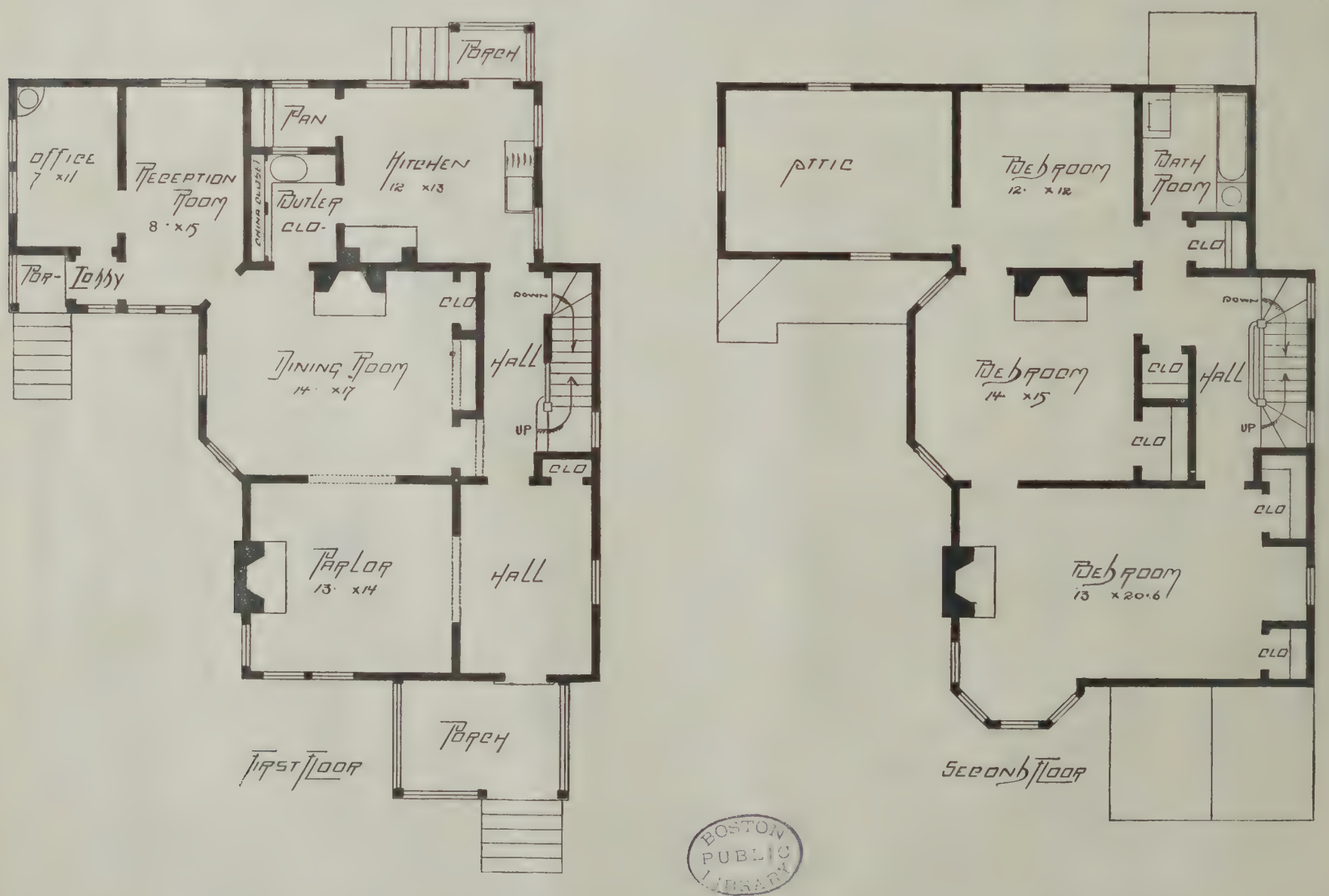




PUBLIC LIBRARY

A RESIDENCE AT GREENWICH—[See page 28.]

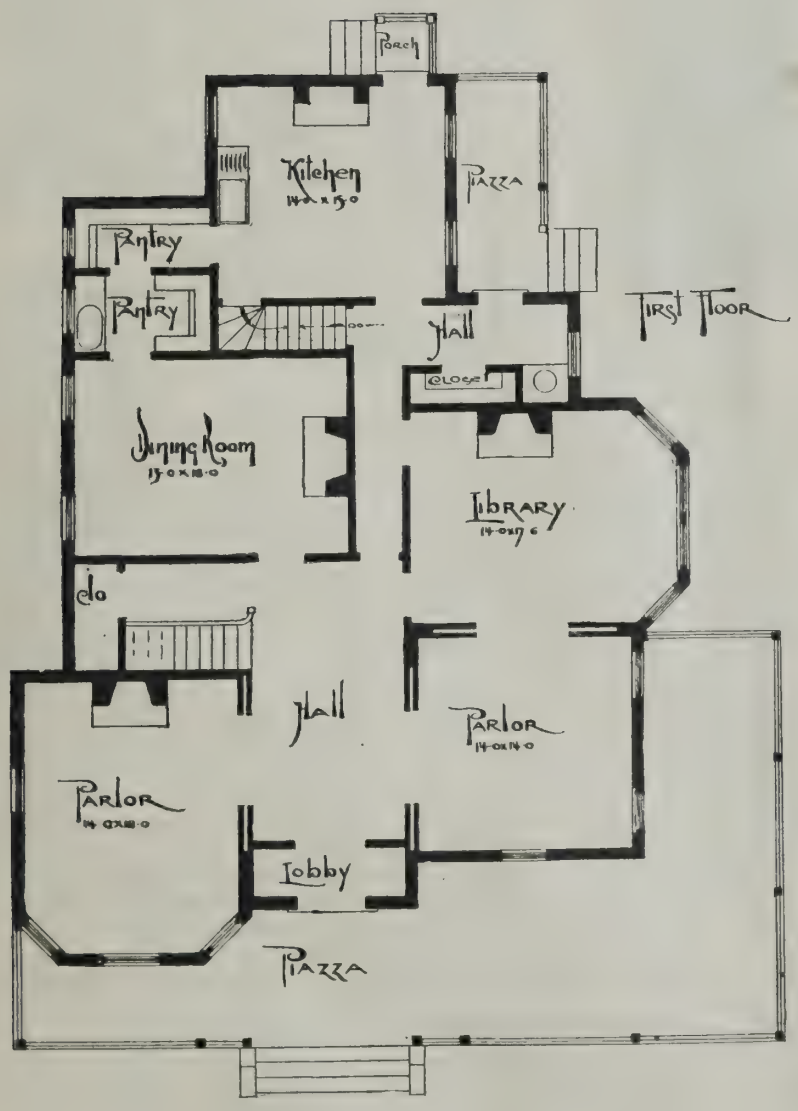


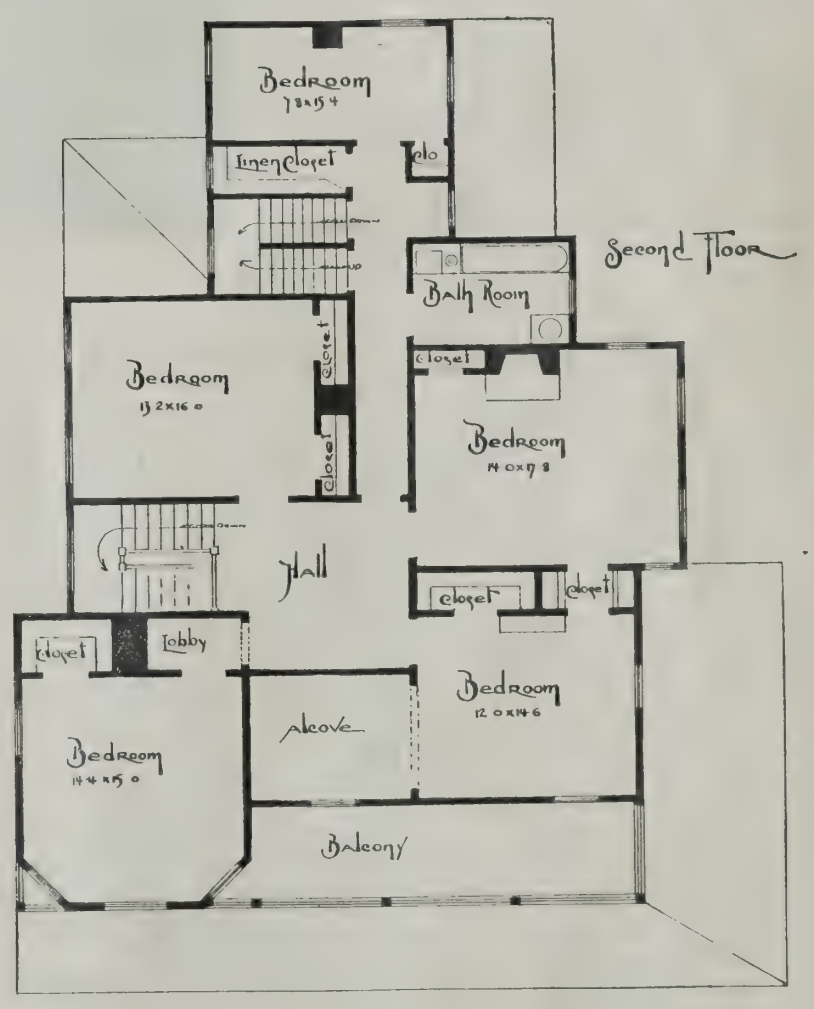


BOSTON PUBLIC LIBRARY

A DWELLING AT STAMFORD—[See page 28.]







A DWELLING AT HOLYOKE.—[See page 28.]

A COTTAGE IN VILLA PARK.

We illustrate a cottage of low cost, erected for Mr. J. C. Viney, at Villa Park, New York. Cost, $3,400 complete. Alfred Chamberlain, of New Rochelle, N. Y., architect. Dimensions: Front, 27 ft. 9 in.; side, 33 ft. 6 in., not including piazza. Height of first story, 9 ft.; second, 8 ft. 6 in. Underpinning brick Exterior framework sheathed, papered, and covered with clapboarding and shingles, painted flaxen yellow, with bottle green trimmings. Roof slated. The principal feature is the circular projection at side, as shown in the engraving, made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN. Hall contains an ornamental staircase of ash. The interior throughout is trimmed with whitewood, finished natural. Doors and windows have beaded casings and turned angle blocks. Fireplaces, of brick, have slate hearths and mantels. Hard wood mantels can be provided in place of the slate ones without extra cost. Kitchen and pantries are wainscoted and trimmed with yellow pine, all fitted up complete. Three bedrooms and bathroom on second floor, and two rooms in attic. Cemented cellar contains furnace. Our engraving was made from a photograph of the building specially taken for the SCIENTIFIC AMERICAN. See page 21.

A RESIDENCE ON CHESTER HILL, N. Y.

We illustrate a house erected for Mr. E. B. Bailey, on Chester Hill, Mt. Vernon, New York. Mr. Louis Herbert Lucas, of Mt. Vernon, N. Y., architect. Dimensions: Front, 25 ft. 6 in.; side, 46 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; attic, 7 ft. 6 in. Underpinning of Tuckahoe marble. First story clapboarded and second story shingled; all painted colonial yellow, with ivory white trimmings. Roof shingled; painted red. Entrance through Dutch door of oak. The most striking feature of the interior is the staircase, quaint in design, with fine spindle balusters, newels, etc. This staircase has seat at side, and a stained glass window, which sheds a pleasant light on upper and lower halls. The interior throughout is finished with whitewood, stained mahogany, and its imitation is so perfect that it is almost imperceptible. Parlor and dining room each have pleasant open fireplaces, with facings and hearths of tiles, and elegant mahogany mantels. Kitchen and pantry are wainscoted, finished natural, and are fitted up complete, the latter having dresser with glass doors, etc. Cemented cellar under whole of building, contains laundry, vegetable cellar, servants' closet, etc. There are four bedrooms, with large closets, and bathroom on second floor, and one bedroom and storeroom in attic. The house is heated by hot air, and has gas, electric bells, and all the improvements. The entire detail of the house, inside and out, is pine colonial. Cost, $5,500 complete. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN. See page 22.

HOUSES ON WEST END AVENUE, NEW YORK.

We illustrate a block of residences, erected for Dr. F. E. Robinson, on West End Avenue, New York City, N. Y. We give plans and description of house shown in the lower left hand corner of the engraving. The others are substantially similar. Dimensions: 24 ft. by 91 ft. 4 in. Height of ceilings: Cellar, 7 ft.; basement, 9 ft.; first story, 11 ft.; second, 10 ft.; third, 9 ft. 6 in. Exterior walls, front and side, are built of Kentucky limestone; other walls of brick. Roof covered with Spanish tiles. Cornice of copper. Cement cellar contains two furnaces, wine and vegetable cellar. Basement, trimmed with ash, contains billiard room, kitchen, laundry, and many pantries, closets, etc. Kitchen and laundry are wainscoted with Italian marble five feet high. First floor and halls, from basement to fourth floor, are trimmed with quartered oak. Drawing room has a large open fireplace, with facings of Mexican onyx, hearth of tiles, and mantel elegantly carved, with mirror, etc. Ceiling has a two foot cove and a center piece. Vestibule has a tiled floor, and double doors (4×8), glazed with beveled plate glass. Hall, or *foyer*, is finished in an elegant manner, and it contains a grand staircase, with a massive carved newel. Hall and dining room have parquet floors, laid with white quartered oak. Dining room has a paneled wainscoting, and a nook with fireplace, seats, etc. Fireplace is furnished similar to one in drawing room; the framework about mantel is filled in with beveled mirrors. Conservatory is wainscoted with Italian marble, and the floor is paved with unglazed tiles. Butler's pantry is fitted up complete, with china closets, dressers, and dumb waiter running to basement. Second floor is trimmed with mahogany, and third and fourth floors with ash Fireplaces are fitted up similar to ones already described. Dressing rooms have parquet floors, and all doors have beveled plate mirrors. Bathroom is wainscoted with Italian marble, and is fitted up in an excellent manner. Fourth floor contains the servants' bathroom. All windows are glazed with the best quality French plate glass. All hardware furniture of solid brass. Mr. Mott, of New York City, architect. Cost, $60,000 complete. Our plate was made direct from a photograph taken specially for the SCIENTIFIC AMERICAN. See page 23.

JOHN RUSKIN.

No one has influenced modern art more in some respects than Mr. Ruskin, who, as an art critic, has no equal in this country, so that any series of photographs of architects and artists would be incomplete without his portrait. Professor John Ruskin, M.A., LL.D., was born in Hunter Street, Brunswick Square, London, in February, 1819, and he is son of a London wine merchant. He was the Newdigate Prizeman at Christ Church, Oxford, in 1839. He then devoted himself to painting. A pamphlet in defense of Turner was his first attempt at literature, and this was developed into a standard work entitled "Modern Painters," commenced in 1843 and completed in 1860. "The Seven Lamps of Architecture" was published in 1849, and the "Stones of Venice" in 1851–53. The works since written by Mr. Ruskin are too numerous to mention here. They include "The Two Paths: Lectures on Architecture and Painting," 1854; "Giotto and his Works," "Elements of Perspective," "Lectures on Art, Decoration, and Manufacture," 1859; "Ethics of the Dust," "Studies of Architecture in Our Schools," "Crown of Wild Olive," 1866; and "The Queen of the Air." Mr. Ruskin was Rede Lecturer at Cambridge in 1867, was elected Slade Professor of Fine Art at Oxford, and in 1872 published "Aratra Pentelici: Six Lectures on the Elements of Sculpture," given before the University of Oxford. He devoted £5,000 for the payment



of a mastership of drawing in the Taylor Galleries at Oxford in 1872. "Arrows of the Chase" appeared in 1880. Prof. Ruskin resigned his Slade professorship in 1884 on account of failing health. He founded and furnished a unique museum, now the property of the Corporation of Sheffield. His autobiography is published under the title of "Præterita." Mr. Ruskin's home is at Brantwood, Coniston. His portrait is from the studio of Messrs. Elliot & Fry, of Baker Street, W.—*Building News.*

A RESIDENCE AT GREENWICH.

The engraving given herewith illustrates an attractive residence erected for Mr. G. Scofield, at Greenwich, Conn. Dimensions: Front, 29 ft.; side, 50 ft. 6 in., not including piazza. Height of ceilings: First story, 10 ft; second story, 9 ft 6 in. This house has fine large rooms, a well lighted hall and staircase, good closet room, bathroom, back stairway, a cemented cellar under whole of house, and a very attractive and comfortable piazza. The foundation is built up with stone laid roughly in cement mortar. The building is sheathed and papered. The first story is covered with half round stuff, laid same as clapboarding, and painted bottle green. The second story is covered with shingles, painted red. The roof is shingled. The hall is good sized, and it is trimmed with oak; it contains a unique staircase, with a cluster of stained glass windows at side, that shed a soft pleasant light on staircase and lower and upper halls. The floor is in hard wood, laid in narrow widths. The parlor is trimmed with cherry, and the library and dining room with oak. The fireplaces throughout are fitted up exquisitely with tile hearths and hard wood bric-a-brac mantels. The kitchen, rear hall and pantry are wainscoted and trimmed with Georgia pine, and are replete in all their appointments. There are four bedrooms, den and bath roomon second floor, and two rooms in attic. The house is heated by a furnace. The ceilings are corniced Cost, $7,800. Mr White, of New York, architect. Our engraving was made direct from a photograph taken especially for the SCIENTIFIC AMERICAN. See page 25.

A DWELLING AT STAMFORD.

We illustrate a dwelling erected for Dr. Hungerford, at Stamford, Connecticut, at a cost of $5,000. Dimensions: Front 40 ft. 6 in.; side 41 ft., not including piazza. Height of first story 9 ft.; second 8 ft. 6 in. Underpinning brick. The exterior throughout shingled, stained sienna. The plan is arranged for the use of a physician, for which it is intended. The trim throughout the interior is of white pine, stained and finished in cherry. Kitchen and bathroom wainscoted, finished natural. Kitchen is furnished with the best improvements. Hall contains an ornamental staircase, with turned newels and balusters; windows on staircase glazed with stained glass. Fireplaces have facings and hearths of tiles, and hard wood mantels. The second floor contains three bedrooms, large closets, and bathroom, two rooms in attic, also storage. Cemented cellar, containing laundry and furnace. Rossiter & Wright, New York, architects. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN. See page 26.

A DWELLING AT HOLYOKE, MASS.

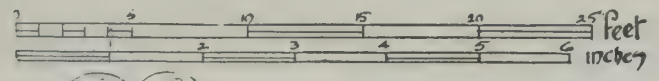
This residence was built for R. A. Houston, Esq., at Holyoke, Mass., at a cost of $9,500 complete. It is a half brick and frame house, with an attractive exterior, the first story being built of local bricks of selected color, with trimmings of brownstone, while the second story is covered with clapboarding and shingles painted dark red, with dark olive green trimmings; the roof is shingled and is painted red. The hall is finished in oak, and contains an ornamental staircase, with a pleasant window on landing, that is glazed with stained glass of rich design. The vestibule doors are glazed with similar glass. The trim throughout is of hard wood. The parlors are finished in cherry, and the library and dining room is finished in quartered oak. These rooms and bedroom over library are provided with fireplaces, tiled hearths and handsome hard wood mantels. Sliding doors connect the rooms. The rear hall has a staircase leading to attic. There are five bedrooms, bathroom, linen closet on second floor; this floor is finished in whitewood, some of which is painted, while the rest is left in the natural. The bathroom is wainscoted. Two rooms and store room finished off in attic. Cellar under whole of house, with a cemented bottom, furnace and laundry. Electric bells are provided, etc. The windows are glazed with stained glass. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN. See page 27.

A DWELLING AND STORE.

Our engraving shows a combined dwelling and store erected for Mr. Ferdinand Olivet, at Mt. Vernon, New York. Mr. W. S. Stickles, of Mt. Vernon, architect. Dimensions: Front 46 ft. 6 in.; side 41 ft. 10 in., not including piazza. Height of ceilings: Cellar 8 ft; first story 11 ft.; second story 10 ft. Underpinning of stone. Exterior sheathed and papered; first story clapboarded, painted colonial yellow, with bottle green trimmings, and second story shingled, painted red. Roof slated. The feature of this plan is that while the store is entirely separate from the living apartments, direct communication is obtained either through hall or office. The trim throughout, except store, is of whitewood, stained and finished in cherry. Store trim is of natural cherry. Hall contains an ornamental staircase, with an elaborate newel, five feet high, of oak. Fireplaces, of brick, have tiled hearths and hard wood mantels, with plate glass mirrors, etc. All apartments are fitted up complete, and the kitchen, pantries and bathroom are wainscoted. Second floor contains the parlor, music room, three bedrooms and bathroom. Two bedrooms and trunk room in attic. Cemented cellar, contains laundry, furnace, and vegetable cellar. There are two interior and one exterior entrance to cellar. Cost $5,600 complete. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN. See page 30.

IN connection with the publication of the BUILDING EDITION of the SCIENTIFIC AMERICAN, Messrs. Munn & Co. furnish plans and specifications for buildings of every kind, including Stores, Dwellings, Carriage Houses, Barns, etc. In this work they are assisted by able and experienced architects. Full plans, details, and specifications for the various buildings illustrated in this paper can be supplied. Those who contemplate building, or who wish to alter, improve, extend, or add to existing buildings, whether wings, porches, bay windows, or attic rooms, are invited to communicate with the undersigned. Our work extends to all parts of the country. Estimates, plans, and drawings promptly prepared. Terms moderate. Munn & Co., 361 Broadway, New York.

Scientific American, Architects and Builders Edition.



Scales



Interior doors

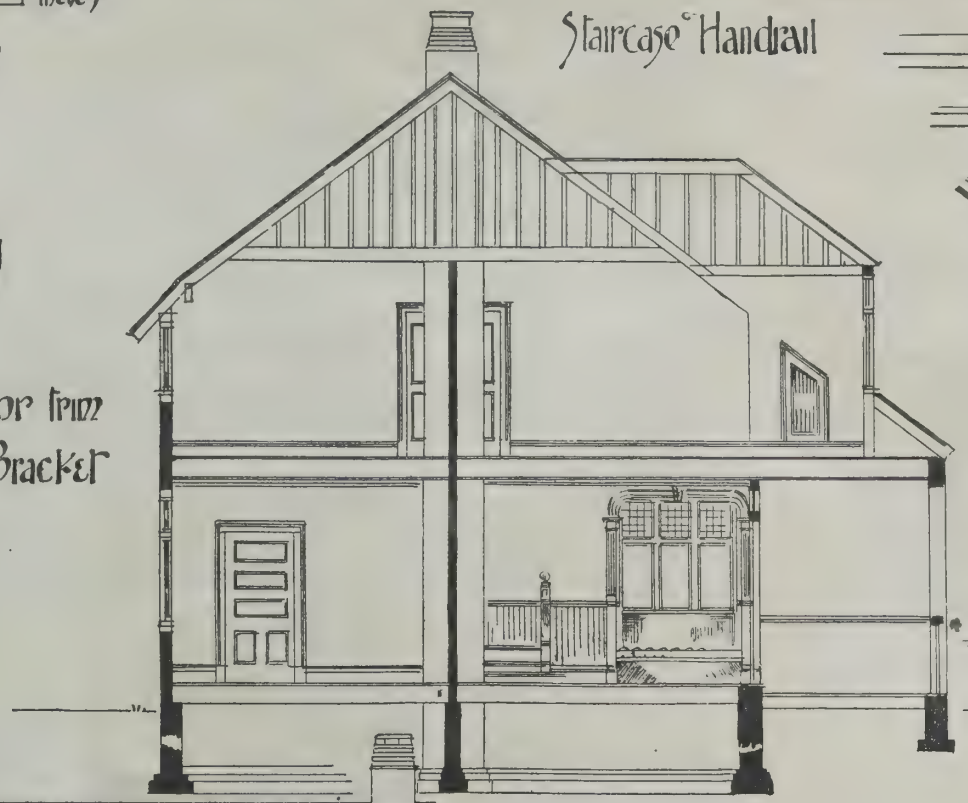


Door trim and Bracket

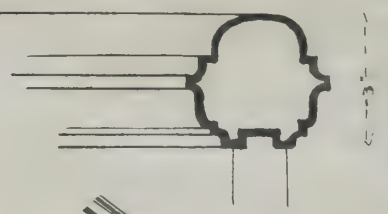


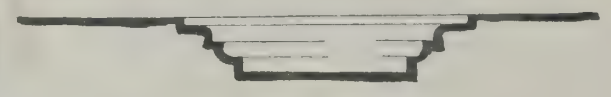
Door Panel

Second Story Base Mold

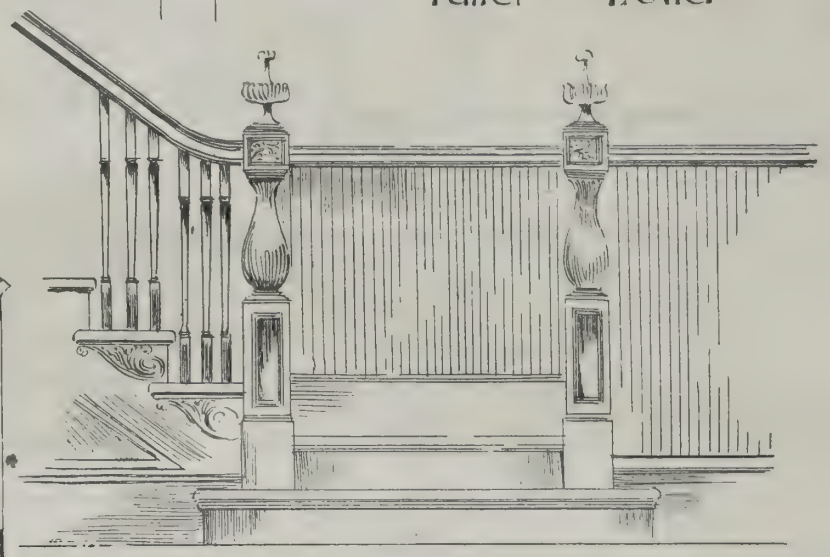


Staircase Handrail





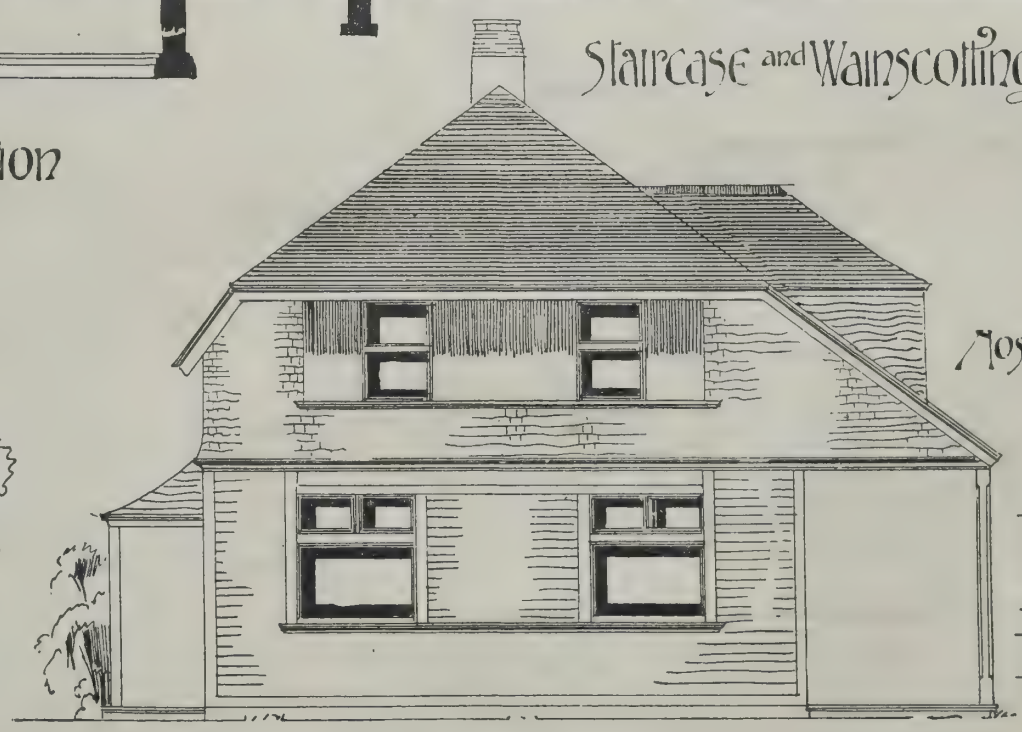
Panel in Newel



Staircase and Wainscotting



Section





Nosing of Treads

First Story base Mold

Front Elevation

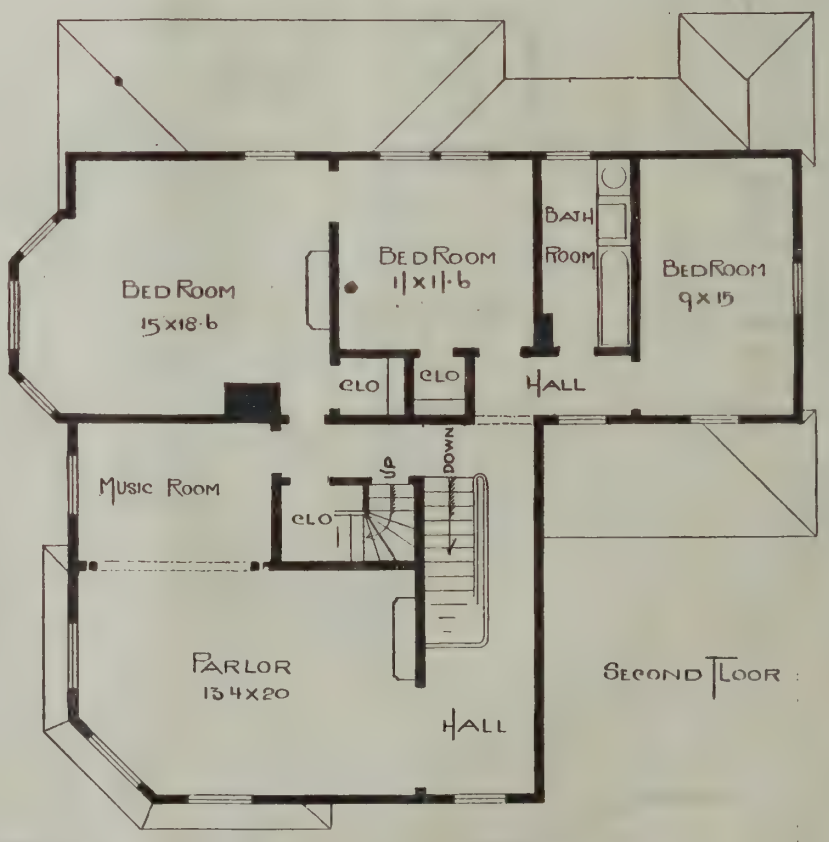
[See page 20.]

Side Elevation

Mr Charles Barnards Cottage Stamford Conn.

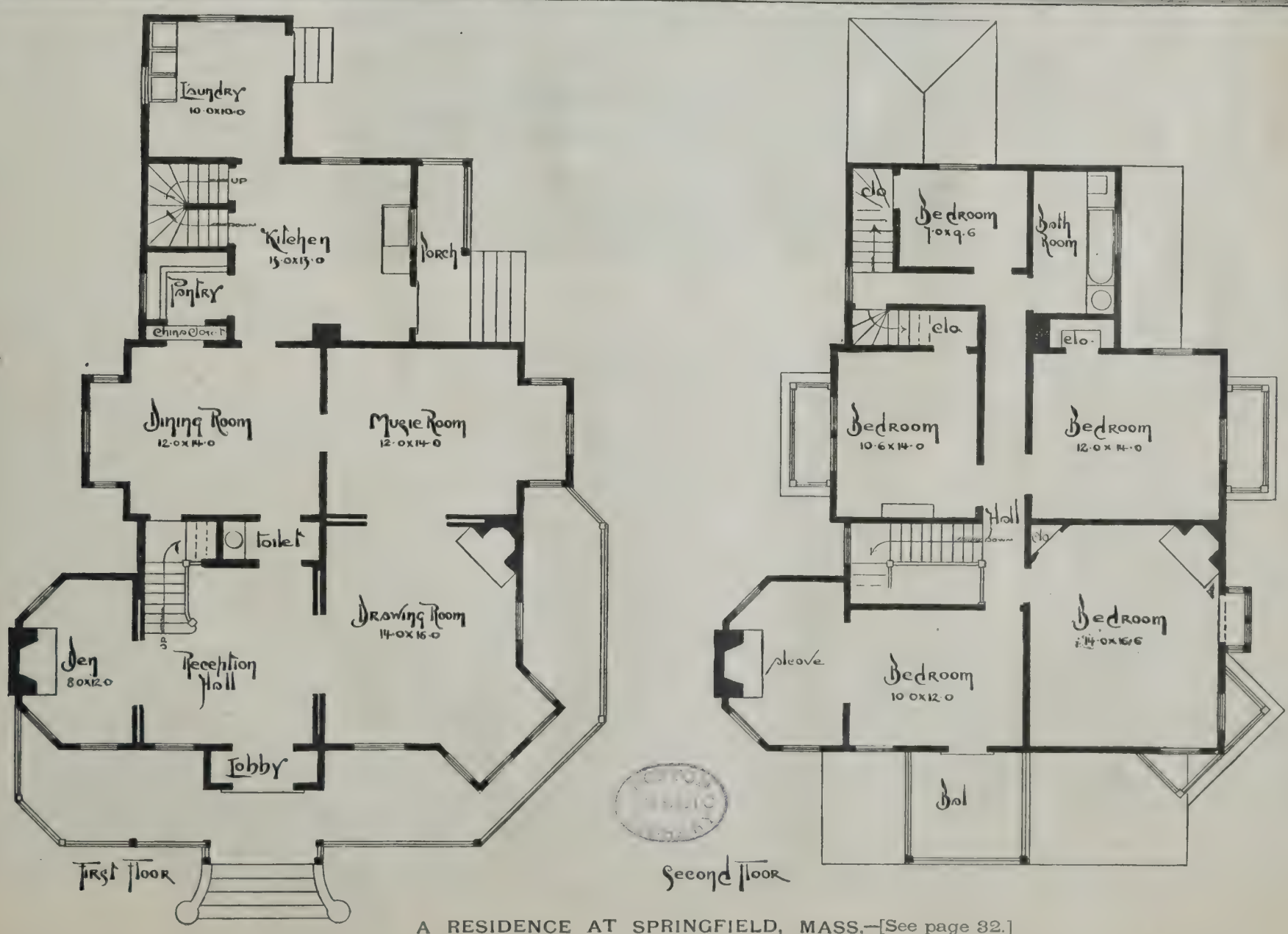






A DWELLING AND STORE.—[See page 28.]





A RESIDENCE AT SPRINGFIELD, MASS.—[See page 32.]

CLEMATIS MONTANA.

This familiar climber is not so old as its frequency on walls and arches in gardens might lead one to suppose, as it was in 1831 that it was brought from Nepaul. It soon became an established favorite, and in the late days of May covers many a wall and gable with a sheet of white flowers so thickly placed that scarcely a green leaf or twig is visible. It really requires no pruning. The plants, if left alone, turn out best, but if thinning out is required, take care of the young wood that gives the finest flowers. We often see C. montana nailed tightly against a wall, the one way to lose its beauty; it should be trained freely and loosely to show off fully its charming gracefulness, impossible if fettered by nails and ties. Its early blooming character, fitness for all ordinary soils, and complete hardiness, save in very cold spots, have raised it to the position it holds in the garden. It must be a poor place that has not rambling over a veranda, trellis, arch, or wall the glorious C. montana. Its value for creating beautiful pictures in the garden is shown by the accompanying illustration.

This specimen, climbing over a stone porch entrance, was planted over thirty years ago in its present position, and blooms freely every year, covering the whole front of the house. It is planted in a border close to the wall, which is sheltered and obtains little surface water. The creeper is cut back once or twice a year. There are other creepers, as honeysuckles, wistaria, etc., intermingled with the clematis. The photograph shows only a small portion of the creeper, as it spreads over a large area.—*The Garden.*

A RESIDENCE, SPRINGFIELD, MASS.

Mr. E. H. Phelps is the owner of the residence we illustrate on page 31. It has been erected on the Highlands, Springfield, Mass., at a cost of $6,000. The exterior is covered with clapboarding, and is painted a pearl gray, with trimmings of a darker shade. The roof is slated. There is a cemented cellar under whole of house, containing steam heater. The entrance is through lobby or vestibule, with doors that are glazed with stained glass. The appearance of the reception hall is quite pleasing, and the den with a fireplace makes a cozy retreat. The hall has an ornamental staircase, with a candelabra on newel, and a closet and toilet under same. The hall is finished in oak, while the den, drawing room and music room are finished in mahogany. The drawing room is provided with a fireplace same as den, and both are finished with hearth and facings of rich tiles and handsome hard wood mantels. The floors are of hard wood. Sliding doors separate the principal rooms. The dining room is finished in ash, and contains a china closet, fitted up with drawers and shelves. There are five bed rooms on second floor, amply provided with closets. These rooms are finished in oak, ash, and cherry, respectively. The two front rooms are provided with open fireplaces. The bath room is neatly wainscoted and is fitted up. A studio, office, play room, store room, and a bed room are finished off in attic. The house is piped for gas, and is provided with all the conveniences and modern improvements.

Our engraving was made direct from a photograph of the building taken especially for the Scientific American.

STABLE FOR A COUNTRY RESIDENCE.

The engraving shows an attractive stable, erected for Mr. Joseph Van Fleck, at Montclair, N. J. Dimensions: front 38 ft, side 29 ft. Height of first story 11 ft. The exterior throughout is sheathed, papered, and then covered with shingles, painted light yellow, with the exception of the circular butt shingles, that are stained to imitate redwood. Roof shingled and painted red. The plan is excellent, and it contains large carriage, stable and work rooms. Carriage room is well lighted, and is supplied with carriage wash connected with drain, etc. Stable contains two stalls and one box stall, all fitted up with the usual iron furnishings, etc. Workroom contains harness closet, with sliding glass doors, also stairs leading to man's room and hay loft on second floor. The interior throughout is ceiled and trimmed with narrow beaded Georgia pine, finished in hard oil. Cost $3,200 complete. Mr. J. C. Cady, of New York, architect.

Our engraving was made direct from a photograph of the building taken especially for the Scientific American. See page 34.

Prevention of Decay in Stone.

Prof Tetmajer, of Zurich, one of the greatest living authorities on such subjects, made recently an investigation into the causes of the decay of stone in buildings, and the best means of preventing it. Many of our readers will remember Viollet-le-Duc's striking observations in regard to the same matter, deduced from an immense experience, and Prof. Tetmajer's conclusions agree entirely with his. According to both, the freezing of water in the pores of stone is the principal cause of its disintegration. Even the chemical effect of the air in large cities, due, it is supposed, to the sulphurous acid contained in it, probably acts through the rain water, by which the acid is washed out of the air, and carried to the stone, so that anything that will prevent the accumulation of water in the pores is likely to diminish chemical action, as well as risk from frost. Contrary to the common idea, the most porous stones are, if properly used, not necessarily most subject to disintegration. If the water falling on the stone has a chance to escape freely, frost will not injure it, but if the movement of the water in the pores is checked, so that it accumulates anywhere, the freezing of this accumulation will gradually destroy even a strong stone. Proof of this may be found in nearly all buildings faced with sand or lime stone. If the base, or water table, or even a belt at any height is of harder stone, the freestone just above it will be found to disintegrate after a few years, owing to the checking of the downward movement of the water in the pores. So, on the under side of a projecting moulding, or balcony, where the water accumulates by gravitation, but is prevented by capillary attraction from dropping off, flakes of stone will soon be observed to separate and fall; and soft stone near the ground, where moisture drawn up from the earth by capillary attraction, joined with the double effect of the rain and the spattering of rain water from the ground, keep it particularly moist, soon perishes. The decay of stone shows itself in two ways. With a stratified stone, the frost dislodges flakes and plates, by working in the natural seams; but with a massive, homogenous stone, the effect of freezing is to dissever the particles of sand, or the crystals of carbonate of lime, so that although the stone may for a long time hold together nearly in its original shape, the rubbing of the hand will dislodge a shower of sand, and the profiles and arrises insensibly lose their sharpness.

The cure for this is, in the first place, to treat the stone with skill A soft stone, if laid above a hard course, should be protected from the rain, so that no water will descend through its pores, to be checked by the hard layer; the lower courses of buildings should be of as hard and impervious material as possible, and vertical joints should be packed hard with cement and jointed, as imperfect joints collect much water, which soaks afterward into the stones on each side; and all projecting courses should have a drip, which will collect the water in the stone and enable it to drop off. In cases where nothing better can be done, the old process of Faure & Kessler, now of Clermont-Ferrand, in France, by which the stone is impregnated with fluosilicates of various substances, according to the character of the stone to be treated, is the only one which has proved itself successful. Something might be done, perhaps, with lime water, and it is curious that where a base moulding has begun to decay, the portions under the vertical joints of the course of stone immediately above, from which small quantities of dissolved lime have probably washed down on the moulding beneath, are preserved, while the intermediate portions are disintegrated; but this application has not been studied to a successful result. In the case of stone not built into a wall, it is often found that while damp with quarry sap, or soaked with rain water, a sudden frost will split the blocks into fragments, and this must be provided against by keeping the stone dry; but Prof. Tetmajer and his assistants report that they have never known a stone to burst with frost after it was built into a wall.—*American Architect.*



A PORCH COVERED WITH CLEMATIS MONTANA. (FROM A PHOTOGRAPH.)

The Porcelain Tower at Nankin.

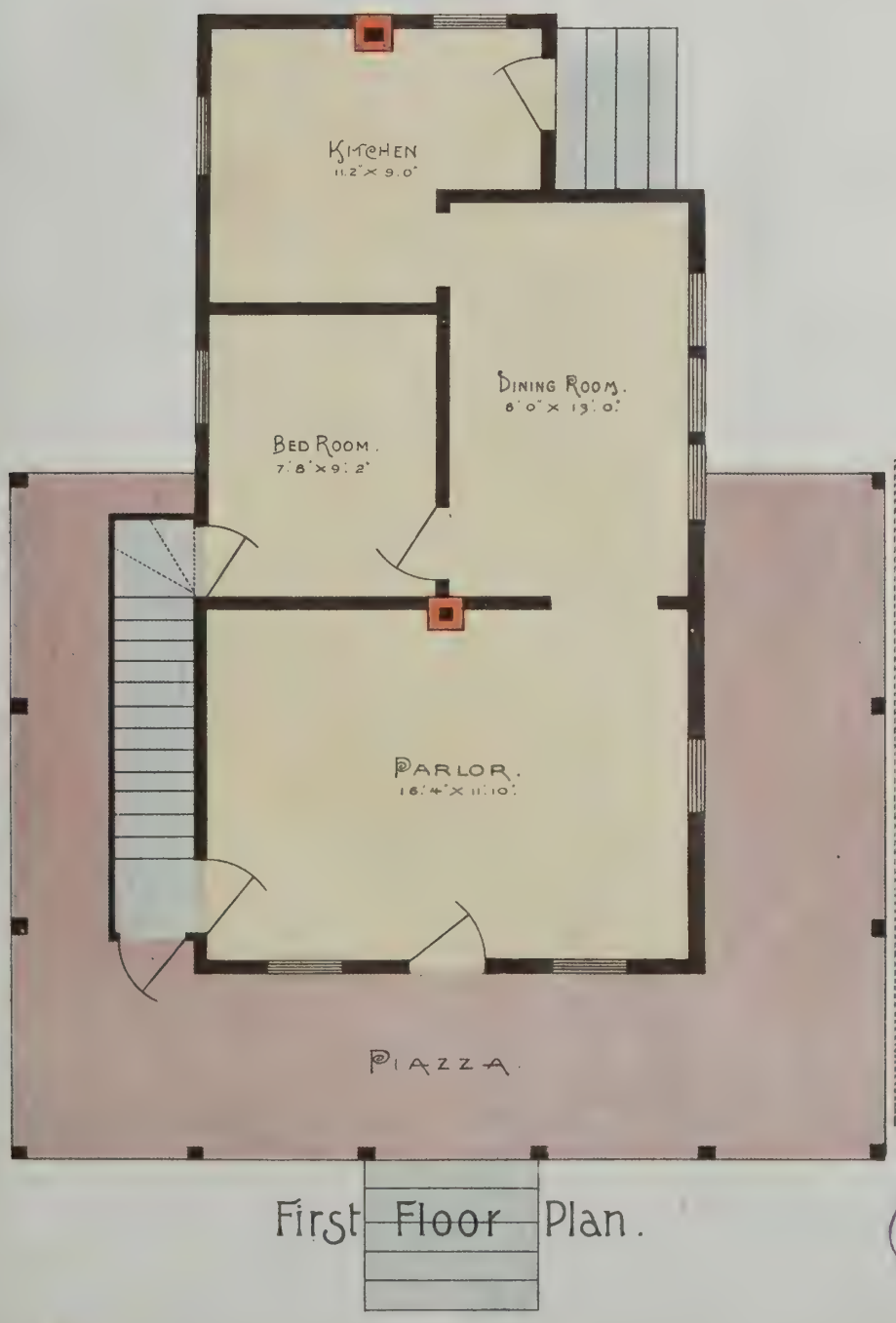
In 1430 A D., after nineteen years of ceaseless labor and an expenditure of about $4,000,000, the Chinese government finished the wonderful porcelain tower at Nankin, which stood for nearly four and a quarter centuries, until 1856, the most marvelous building ever erected by human hands. It was of octagonal form, 260 feet in height, with nine stories, each having a cornice and gallery without. The name of Porcelain tower was applied to this unique structure on account of the fact that the whole of the outside work was covered with porcelain slabs of various sizes and colors, but principally of red, white, yellow and green. At every one of its nine stories the projecting roof of the gallery was covered with green tiles, each corner being provided with a bell varying in weight from 300 to 1,000 pounds. There were 152 bells in all, each so nicely balanced as to rock back and forth as they were swayed by the breezes, giving out a continuous strain of beautiful but weird music. Ranged in rows between the bells were 128 brass, bronze, and silver lamps, which were lighted every night in the year. The apex of the tower, starting at its base at the 250 foot level and extending upward for a height of ten feet, was a monster gilded pineapple, surmounted by a copper ball about two feet in diameter. A spiral stairway of over 300 steps led from the base to the summit. The building was constructed as a gift to an empress, and was always kept in repair by the government. Lightning struck it in 1801 and tore down the three top stories. The injury was repaired as soon as possible. Probably it would be standing to this day had not the Taiping rebels imagined its lights and bells disastrous to their cause.—*Commercial Advertiser.*

Every man has at some time in his life a personal interest in architecture. He has influence on the design of some public building, or he has to buy or build, or alter his own houses. It signifies less whether the knowledge of other art be general or not. Men may live without buying pictures or statues: but in architecture all must in some way commit themselves; they must do mischief and waste their money, if they do not know how to turn it to account. Churches and shops and warehouses and cottages, and small row or place, and terrace houses must be built and lived in, however joyless or inconvenient; and it is assuredly intended that all of us should have knowledge in matters in which we are daily concerned, and not to be left to the caprice of architects or mercy of contractors.—*Ruskin's Stones of Venice.*

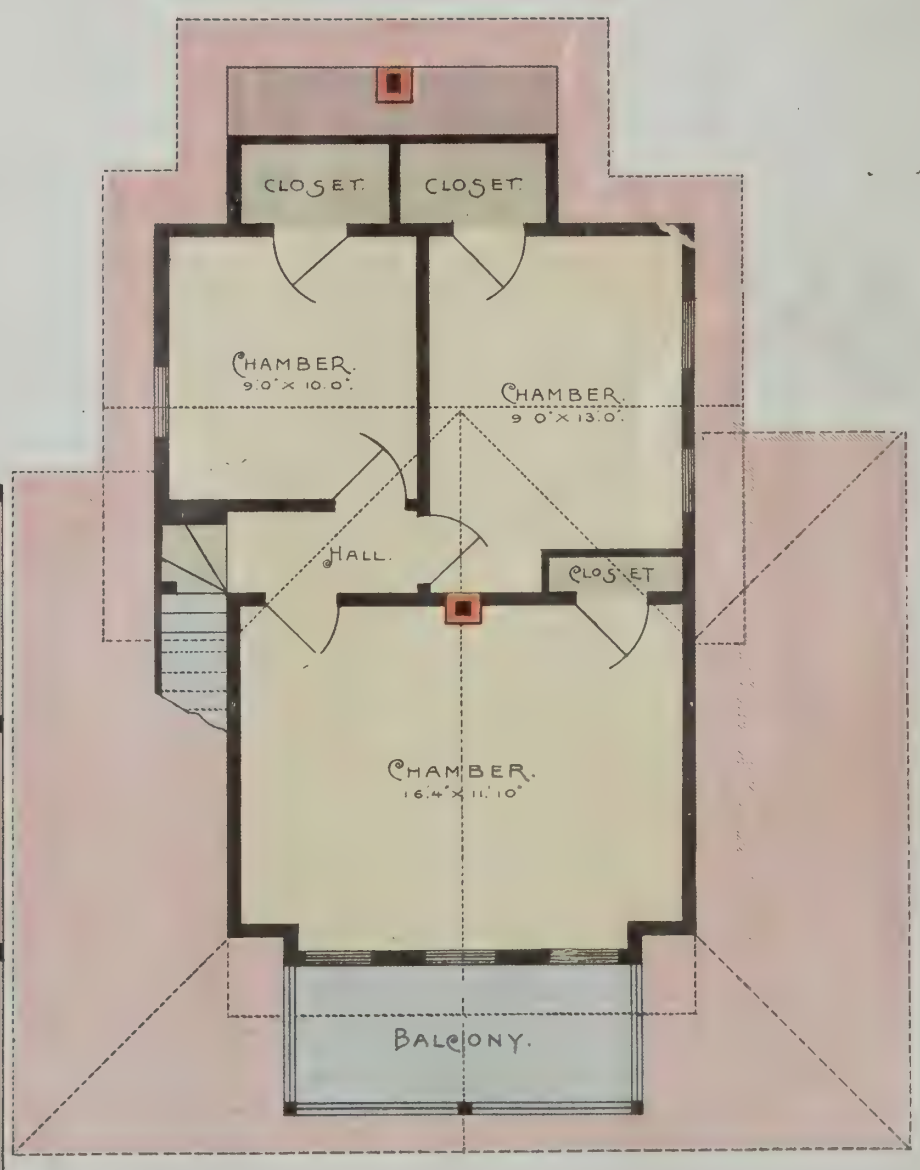
Whoever can devise practicable devices for saving the waste of wood-working, such as sawdust, chips or shavings, has the encouragement of knowing that he is likely to find an increasing demand, because the supply of wood suitable for structural use is running short all the time. Then, too, this waste, if thrown into streams, is bad for the fish living in and the folks living alongside them, and not seldom it is a source of danger in connection with fires.



A COTTAGE FOR NINE HUNDRED DOLLARS.



First Floor Plan.

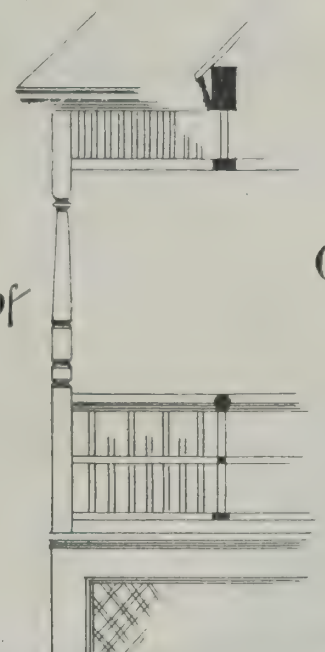


Second Floor Plan.

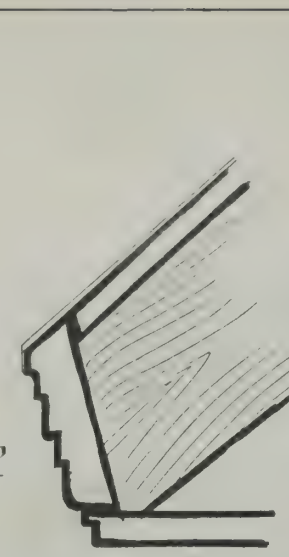
PUBLIC LIBRARY

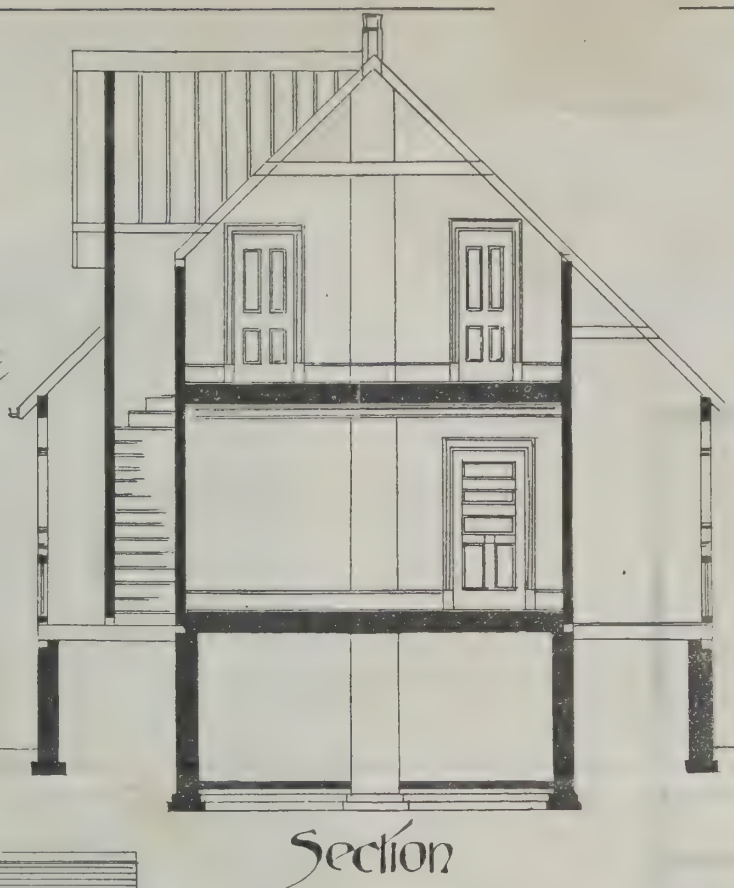
SCHUMACHER & ETTLINGER, NEW YOR

Details of Porch

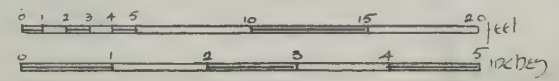


Cornice





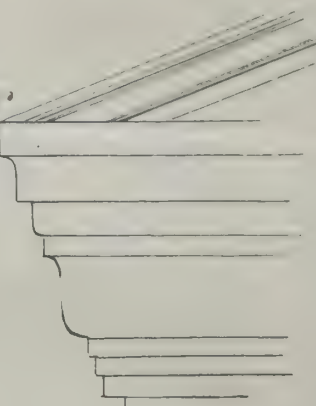
Section



Scales



Windows in Front Dormer



Window Cornice

Side Elevation



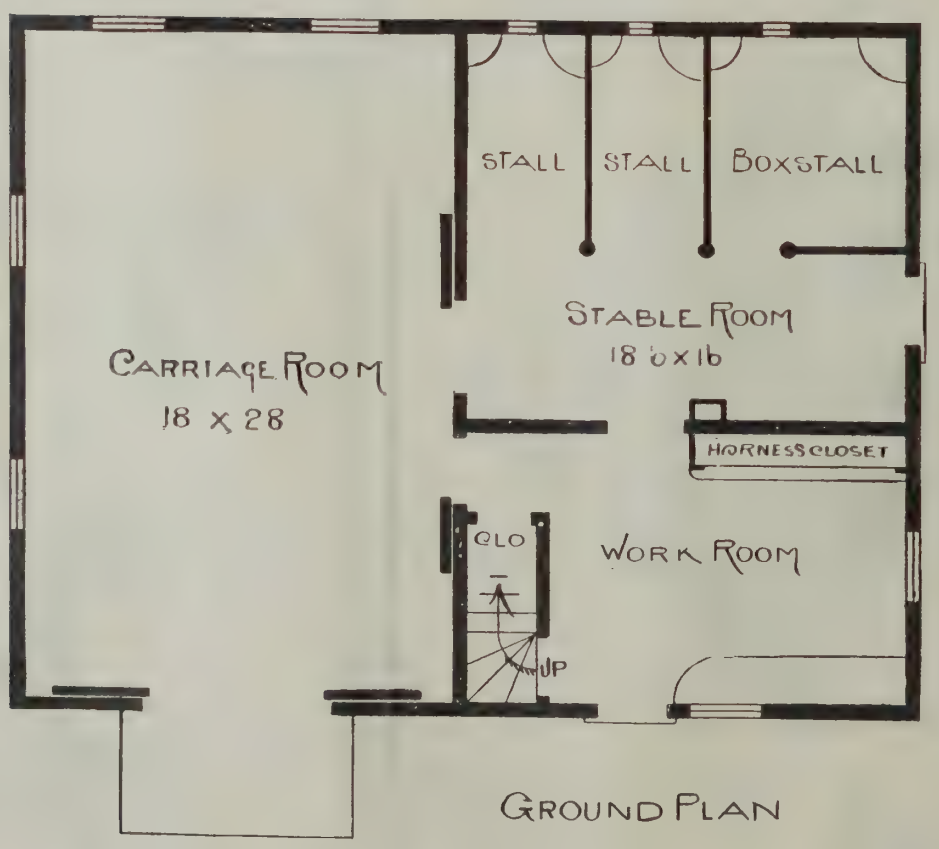
Front Elevation

A Cottage for Nine Hundred Dollars

[See page 20.]

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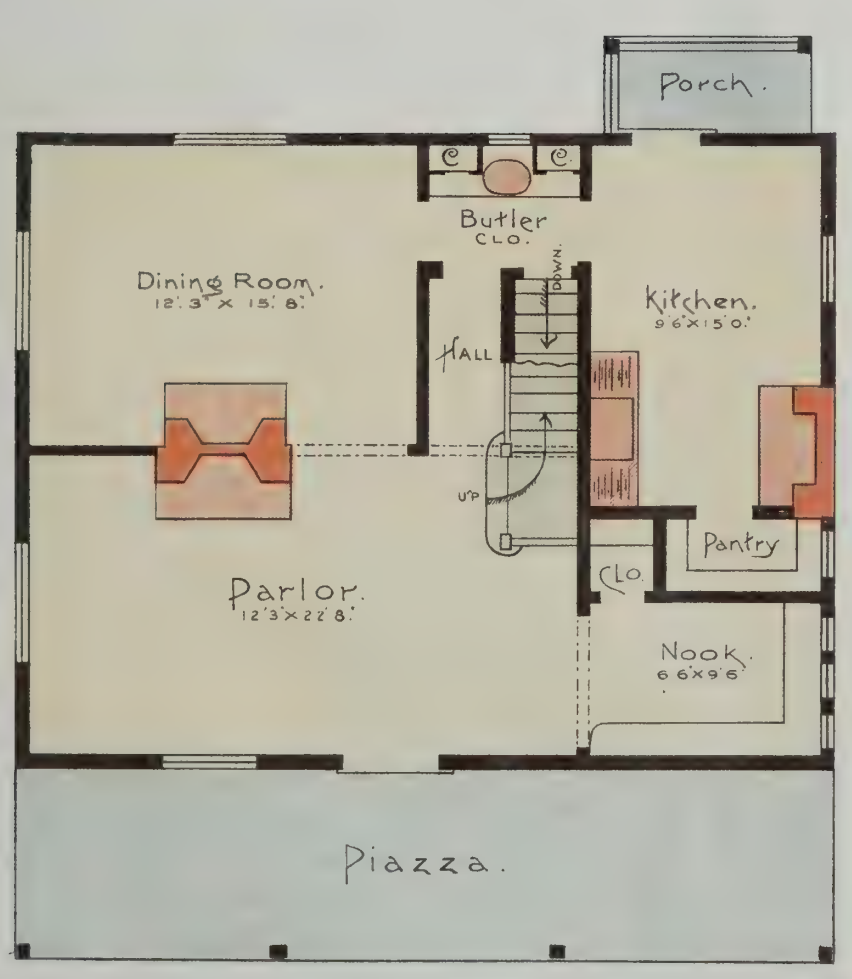


GROUND PLAN

STABLE FOR A COUNTRY RESIDENCE.—[See page 32.]

MR. CHARLES BARNARD'S COTTAGE, STAMFORD CONN.





First Floor Plan.



Second Floor Plan.

LIBRARY

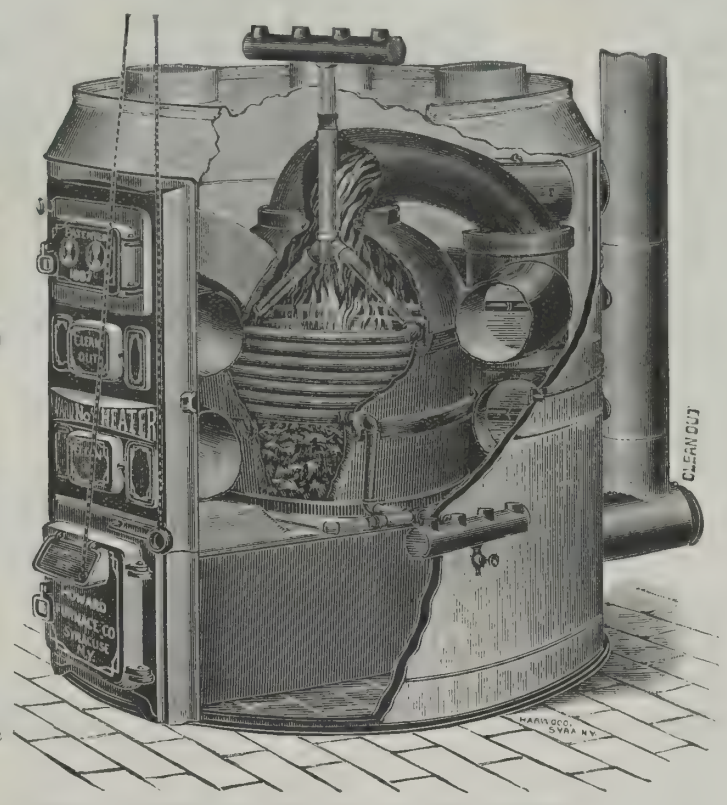
THE HOWARD HEATER.

The combination warm air and hot water heater shown in the accompanying illustration differs from former heaters made by the same company in the fact that it is constructed with a sectional fire pot, leaving the lower section for radiation of warm air as in their regular warm air furnace, the coil being in and around the upper section of the fire pot in such a position as to produce a positive and rapid circulation of water. This combination system is also designed to be extremely simple, the apparatus, having been once filled, requiring no further attention. Great economy and superiority are claimed for this combination system over steam, and the system can be readily adapted to all conditions of weather, a thing not readily attainable with steam heating.

In the damper regulator shown, with thermometer attachment, Mr. Howard has perfected an ingenious and effective device which is both useful and ornamental. It is a metal plate finished in either nickel or bronze, about seven inches long by three inches wide, in the center of which is a guaranteed thermometer. The nickel draught chain can be operated from either side, and is held in place at any position in which it is left, while the draught can be regulated at the furnace without the necessity of going to the regulator. Those who are interested may obtain an illustrated catalogue of the Howard furnaces and heaters by writing the Howard Furnace Company, Syracuse, N. Y.



Damper Regulator with Thermometer.



THE HOWARD WARM AIR AND HOT WATER HEATER.

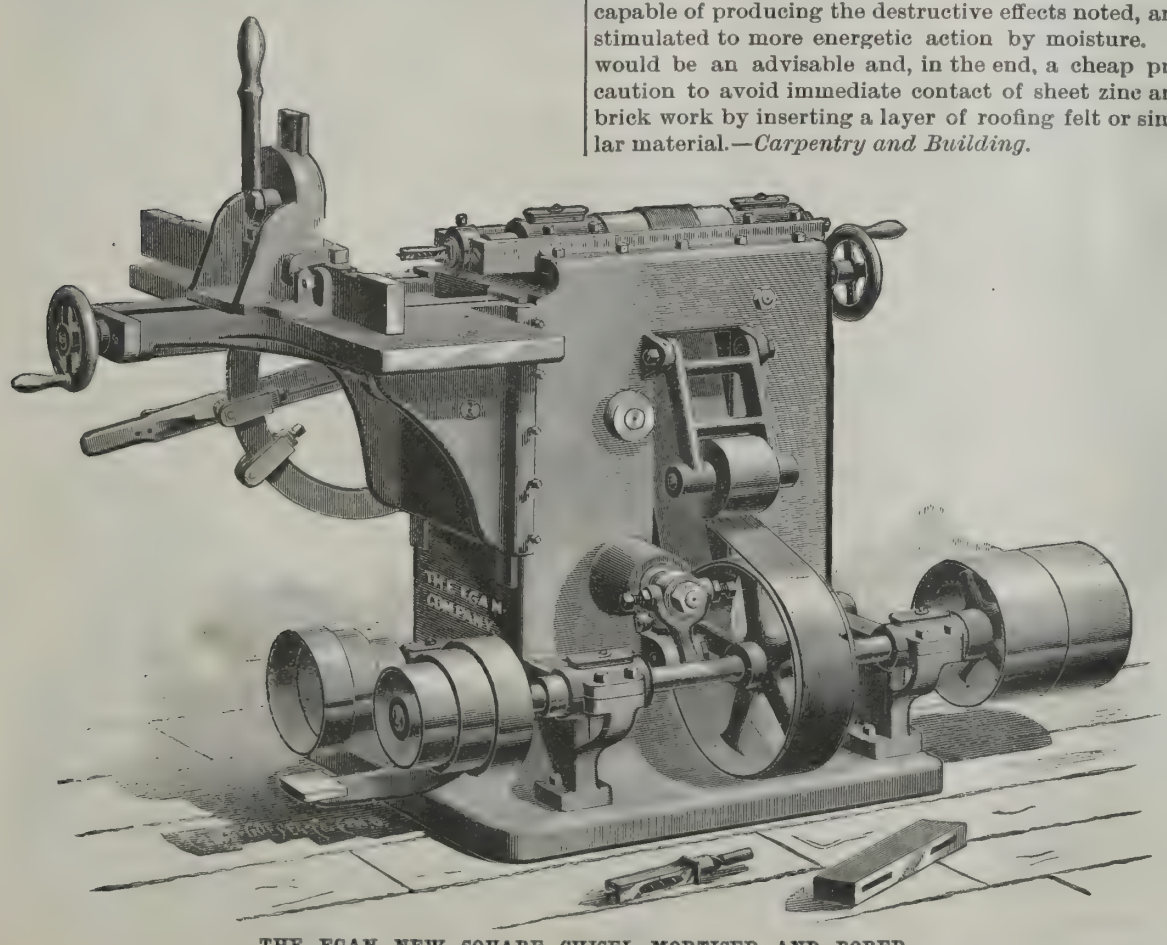
Effective Lightning Rods.

During the recent severe storm at Bluff's Point, on Lake Champlain, by which it was at first thought the new hotel there was destroyed, the discharge of electricity was very great, in addition to the almost tornadic force of the wind. The hotel was, however, protected by lightning rods which had been put up but a few days before by Messrs. J. D. West & Co., of New York, and no damage was sustained from lightning, although every occupant of the house at the time is said to have been thoroughly alarmed. The building is a long parallelogram, with towers in the middle and at each end, and the rods upon it were half-inch square hollow copper rods, run over the ridges of the roofs, with points on all pinnacles and gables, and all connected and run down on corners and into the earth ten feet where practicable, also being connected to water and sewer pipes.

AN IMPROVED SQUARE CHISEL MORTISER AND BORER.

The accompanying cut represents a new square chisel mortiser and borer for making mortises in either hard or soft wood. It is designed to make a mortise from 5-16 inch square up to 1 inch square, and any depth up to 6 inches and almost any length, leaving the mortise free from chips and saving time and money, as no clearing out of the mortise is necessary. It will be found suitable for sash, door and blind, and furniture factories, wagon, carriage, and plow work, etc. The column is very heavy and strong, being cast hollow. All necessary parts are planed perfectly true. The countershaft runs in boxes which are a part of the main column, making a complete machine.

The mortise chisel is connected to a heavy reciprocating slide working in planed ways, and operated by a treadle. This slide is provided with journal boxes for the boring mandrel to run in, and carrying a boring bit, operating through the square chisel, drawing the chips away from the cutting edge and discharging same through a slot in the chisel. One great improvement is an ingenious device for changing the length and speed of the stroke to suit the depth of mortise to be made. Suitable provision is made to increase the number of strokes according to the depth of mortise. The builders furnish with the machines six chisels, each ¼, ⅜, ½, ⅝, ¾, and 1 inch, and augers to suit. For further information address the Egan Company, Nos. 209 to 229 W. Front Street, Cincinnati, Ohio, U. S. A.



THE EGAN NEW SQUARE CHISEL MORTISER AND BORER.

Zinc and Brick Work.

Recent experience in Germany points to the fact that under some conditions sheet zinc, when in direct contact with brick work, suffers from rapid corrosion. It appears that in building the Berlin city market halls some sheet zinc work which rested upon brick walls was deeply pitted at a number of places, and particularly where the metal was in direct contact with the bricks. Chemical examination of these showed that they contain as high as 1.14 per cent of soluble salts, capable of producing the destructive effects noted, and stimulated to more energetic action by moisture. It would be an advisable and, in the end, a cheap precaution to avoid immediate contact of sheet zinc and brick work by inserting a layer of roofing felt or similar material.—*Carpentry and Building.*

The Hartman Sliding Blinds.

Messrs. Hartman & Durstine, of Wooster, O., have lately made a contract for a large lot of these blinds for the St. Frances Hospital, of Freeport, Ill., which have just been put in place in that fine building. The hospital authorities express themselves highly pleased with the blinds.

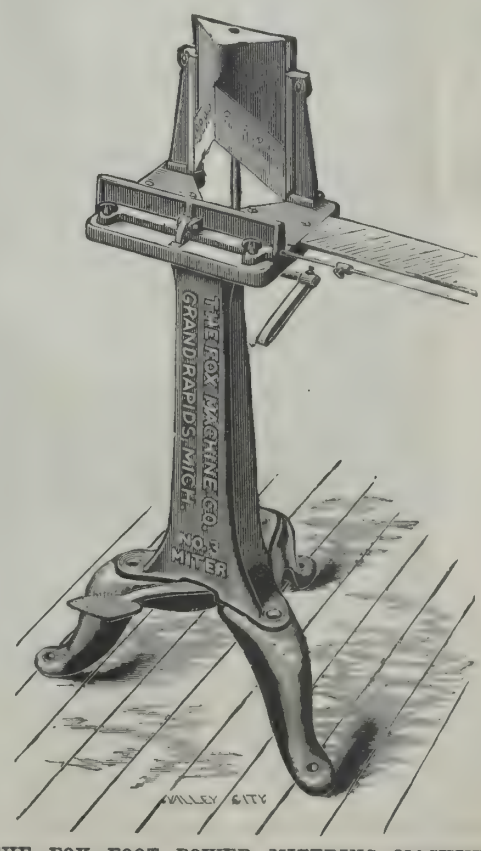
THE Pierce, Butler & Pierce Mfg. Co. of Syracuse, N. Y., have recently opened a fine office in Chicago, at 96 Lake Street, from which the entire Western business of the firm will in future be handled. It is their intention to carry a large stock of Florida steam and hot water heaters for hard and soft coal, also a large stock of radiators, etc. The company has likewise opened offices at No. 60 Barclay Street, N. Y., and No. 237 Franklin Street, Boston, and also largely increased its facilities at their factory in Geneva, N. Y., by erecting a mammoth machine shop and making additions to the large foundry. The force of men has been greatly increased, and they have the latest and best facilities and conveniences for turning out work promptly and in good shape, so that this year they are in better condition to meet the demands of their customers than ever before. Up to the present time this year they state that their sales have been about one-half larger than those of last year up to the same time.

WOOD-WORKERS demand machinery for rapid and perfect production. They are then enabled to get their work out faster, and in larger quantities. The late improved time and labor saving machines of the Egan Company, of Cincinnati, Ohio, U. S. A., are now prominently and favorably known almost everywhere. A new catalogue is soon to be issued, containing cuts and descriptions of their late improved woodworking machinery, and which will be sent on application from parties interested.

THE newest designs of hot blast apparatus for drying lumber and heating buildings form the subject of a fifty page illustrated catalogue recently issued by B. F. Sturtevant, of Boston, a copy of which will be sent to all interested who will apply therefor. The kilns and apparatus furnished by this house have been entirely redesigned, and the results of an extended experience are embodied in the work now offered.

AN IMPROVED MITERING MACHINE.

The accompanying illustration represents a power mitering machine, made by the Fox Co., of Grand Rapids, Mich., each machine l[illegible] rule and stop, the latter being attached to the sliding gauge, and traveling back and forth with it. The machine is made in two sizes, No. 3, weighing 140 lb., and mitering mouldings up to three inches wide, while No. 5 weighs 250 lb., and miters mouldings up to five inches wide. The company also make a special machine for cutting mouldings for caskets, and one for pointing pickets.



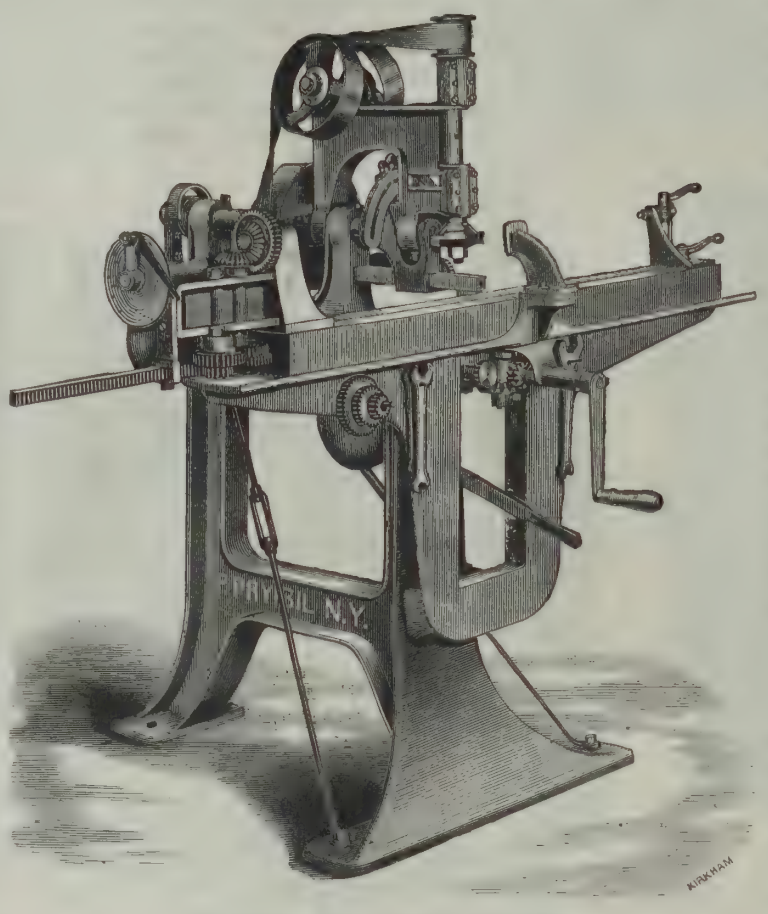
THE FOX FOOT POWER MITERING MACHINE.

AN IMPROVED TWIST MACHINE.

The accompanying illustration represents a machine designed to produce all kinds of spiral or rope mouldings, either straight, tapered, curved or oval. It will make right, left and pineapple cuts, and will do straight fluting. It will cut from one to six threads on a piece, and will make any degree of twist, from one turn in 1½ inches of length to one in 10½ inches. Twenty different degrees of twist are made by changing two wheels on a single screw, according to a table attached to the machine, and right or left are produced by simply changing the gears to the right or left side of the rack.

All work is done with revolving cutters similar in shape and arrangement to those used on variety shapers. They are held between collars that are so arranged that the knives have a peculiar action, cutting from the outside in, and making a smooth cut even against the grain. They revolve always in the same direction, whether the twist be right or left, and one set will produce several different shapes of work. Changing from one degree of twist to another, or from right to left, takes less than one minute. This machine will swing eight inches, and will take forty-two or sixty inches between centers, according to length ordered. The knives employed are four in number, two right and two left.

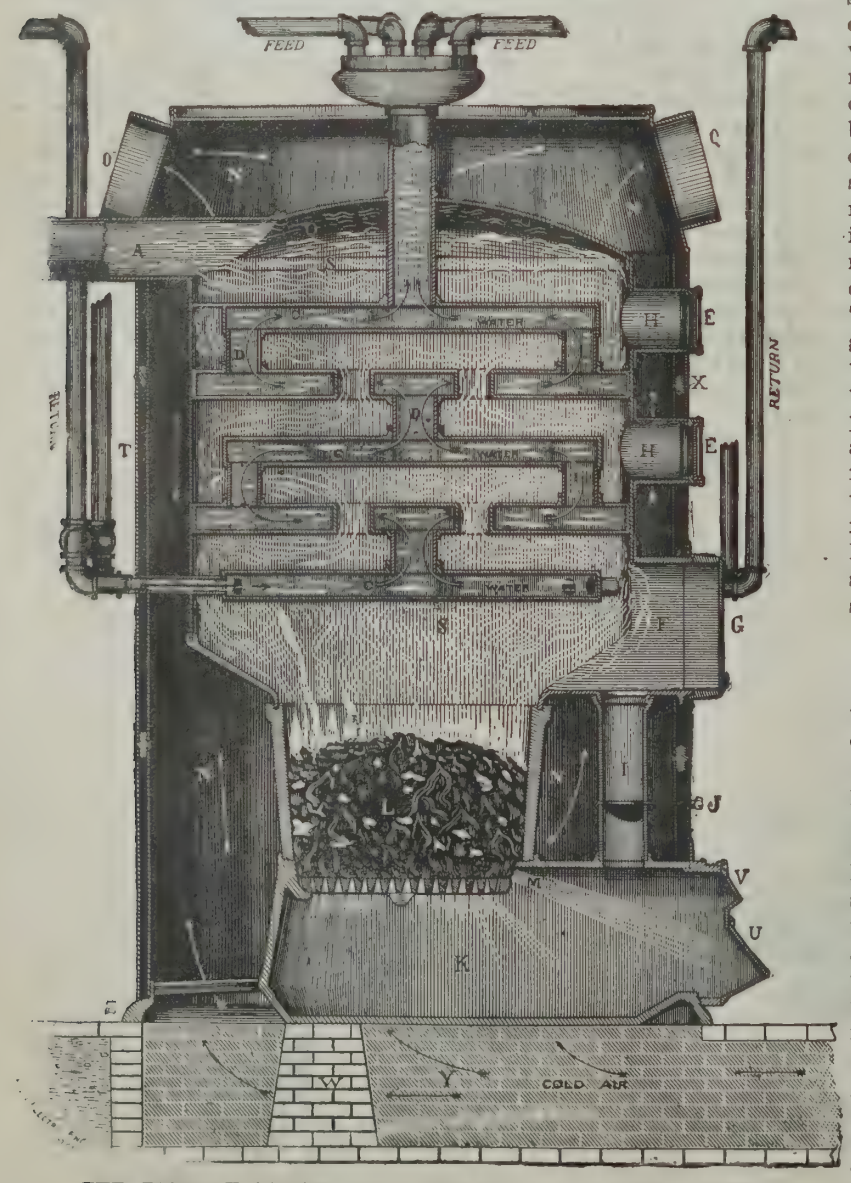
For further information relative to this machine, address the manufacturer, Mr. P. Pryibil, No. 518–524 West Forty-first Street, New York City.



PRYIBIL'S NEW TWIST MACHINE.

AN IMPROVED HEATER.

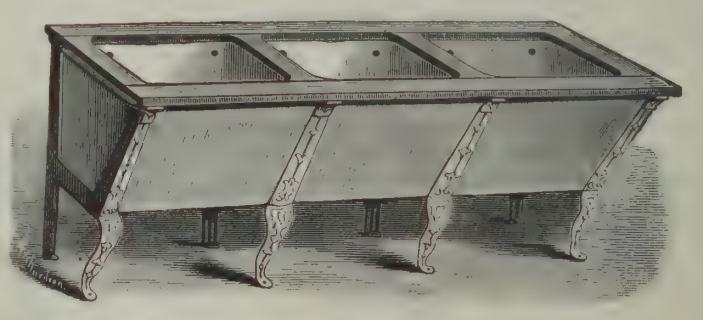
The accompanying illustration represents a combination hot water and warm air heater recently perfected by the J. F. Pease Furnace Co., of Syracuse, N. Y. The indirect heat is produced by taking the air from the outside through a cold air duct and passing it through a surrounding air-heating chamber in the same manner as by a warm air furnace, the air being moistened by water evaporation before being distributed to the registers. The direct hot water radiation is obtained by a continuous circulation of water through chambers one above the other, connected together by upright connections. These chambers are suspended inside the combustion chamber in such a manner as not to impair the draught, but to retard the exit of the products of combustion until the heat is entirely yielded. By this construction the water circulation is positive and continuous, the returns entering the lower chamber on such side of the heater as may be most convenient, and the water circulating upward through every portion of each chamber before reaching the distributing feed pipe, passing as many times over the fire as there are sections used. This combination system of heating is designed to provide means for more perfect ventilation than is possible with any all-hot-water heater. This heater also has the advantage of a thoroughly tested construction, its main features being the same as those of the heaters so successfully manufactured by the company during the past ten years.



THE ECONOMY DIRECT AND INDIRECT HOT WATER HEATER.

A PERFECT SANITARY WASH TUB.

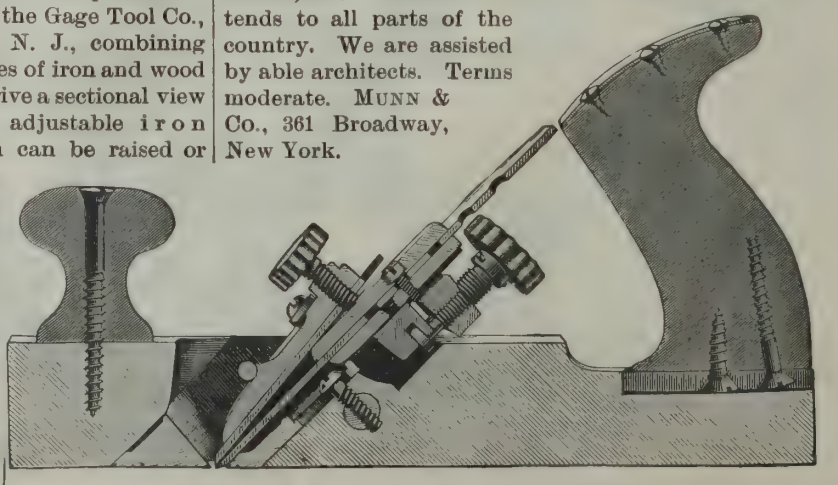
The accompanying illustration represents one of a number of styles of solid white crockery wash tubs made by the Stewart Ceramic Co., of No. 312 Pearl Street, New York City, made after Morahan's patent, and which has been pronounced to be one of the most perfect sanitary tubs in existence. Each tub is made in one piece, and consequently has no seams to open, while it is made of practically imperishable material, with its surfaces thoroughly glazed, so that they are smooth and non-absorbent. They are made very strong, to stand rough usage, and in order that wooden wash boards may be dispensed with, each tub has a smooth, moulded, corrugated surface on the inside front, with a moulded recess in one corner for holding soap. These tubs are set up on galvanized iron stands, with an ash frame on top, giving a strong setting, while presenting a neat and cleanly appearance, and affording no room for lodgment of filth or vermin. The same firm also make solid white crockery butler's pantry, slop, and kitchen sinks, of similar finish and strength.



SOLID WHITE CROCKERY STATIONARY WASH TUBS.

AN IMPROVED BENCH PLANE.

The illustration represents a tool made by the Gage Tool Co., of Vineland, N. J., combining the advantages of iron and wood planes. We give a sectional view showing the adjustable iron throat, which can be raised or lowered as desired if the wood wears away. The tool is self-setting in every respect. The bit being simply dropped into position sets the plane accurately, and when properly adjusted it cannot be set wrong. The throat is prevented from wear by being within the adjustable iron bit holder, which extends through the plane. The cap is not attached to the cutter, but remains stationary while the cutter is moved up or down by a thumb-screw, so that while at work the thickness of a shaving can be changed by a simple movement of the thumb and finger. This tool is adapted to the coarsest or the finest work, and will smooth hard or soft wood against the grain. The plane stocks are saturated with hot wax or oil. The company is in receipt of numerous flattering testimonials as to the high character of these tools and the excellent work done therewith.



THE GAGE SELF-SETTING BENCH PLANE.

The Muncie, Ind., Architectural Iron Works.

The work of erecting buildings for the establishment of this business was commenced in January last, and everything was ready for the manufacture of goods on the first of May. Natural gas is used for fuel and light, and an artesian well furnishes an abundant supply of water. The best shipping facilities are afforded, as there are four distinct lines of railroad running in and out of the city, and the same rates are given as for Indianapolis. All kinds of architectural iron work are made, and also a large line of iron fencing and ornamental iron work of various kinds.

A Large Contract for Steel Roofing.

A contract for 350,000 square feet of the H. W. Smith Patent Folded Lock Seam roofing, together with a large amount of galvanized steel, corrugated steel, cornices, etc , for twenty-six large buildings, comprising the shops of the Northern Pacific R.R. Co., at Tacoma, Washington, was lately awarded to the Canton Steel Roofing Co , of Canton, Ohio. It is said that, without counting this contract, the trade of this firm for the first half of 1890 shows a large increase over that of the first half of 1889.

New York Central Iron Works Co.

W. B. Dunning, of Geneva, N. Y., has formed a stock company of $100,000 capital for the manufacture of his patent Steam and Hot Water Heaters. It will be known as the New York Central Iron Works Co. Mr. Dunning remains at the head of the new organization as president, and they will continue to manufacture engines and boilers of all kinds, as well as jobbing and repairing; also furnish iron and brass castings of all kinds. It is expected that the capacity of the works will be increased, and a large amount of new machinery put in. The works are located right beside the railroad station, and cover nearly an acre of ground.

Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. Munn & Co., 361 Broadway, New York.



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BOILERS.

Cannot collapse.
Will not leak.
Ordinary boiler tested to 200 lbs.
Extra heavy tested to 300 lbs.
Made of two seamless drawn copper shells.
Handsomest, best and strongest in the market.
Send for circular giving instructions for prevention of accident.

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We desire to call attention of consumers to the fact that we guarantee our ready mixed paints to be made only of pure linseed oil and the most permanent pigments. They are not "Chemical," "Rubber," "Patent," or "Fireproof." We use no secret or patent method in manufacturing them by which benzine and water are made to serve the purpose of pure linseed oil. Sample cards, containing 50 desirable shades, sent on application.

FINE VARNISHES,
WOOD FILLERS,
WOOD STAINS

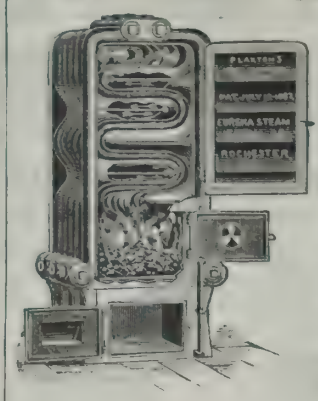
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MATHEMATICAL INSTRUMENTS.

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Plaxton Hot Water Heater

WHY IS IT SUPERIOR TO ALL OTHERS?



It has the most Direct Heating Surface.

Perfect and Positive Circulation.

13 Feet Fire Travel—**Heat and Water moving in the same direction.**

Each Section forms its proportion of Fire Pot, Smoke Flue, and Grate Surface.

Easily cleaned, as all Fire Surfaces can be seen and reached. Rocking Grate, to burn hard or soft coal or wood. Expansion and contraction amply provided for. Covered with an indestructible Asbestos Jacket, which prevents the loss of radiating heat into basement. A heater which has never failed to give satisfaction. Write for catalogue Z Z.

BOILERS.—(STEAM AND HOT WATER) Eureka Vertical Boilers; Eureka Horizontal Boilers; Plaxton Hot Water Heaters; Brick Set and Portable; Self-feed and Surface Burners.

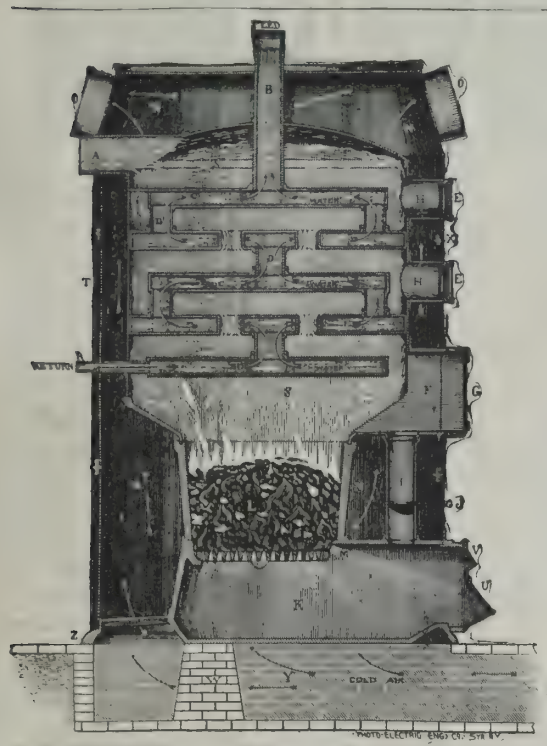
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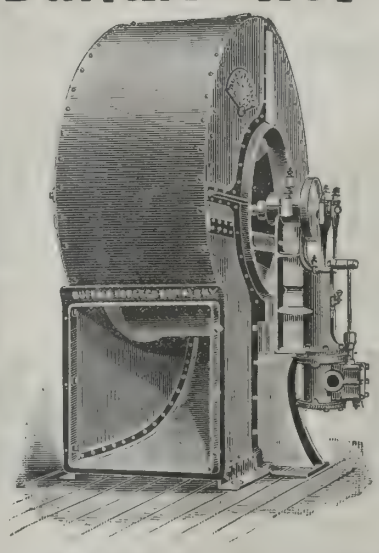
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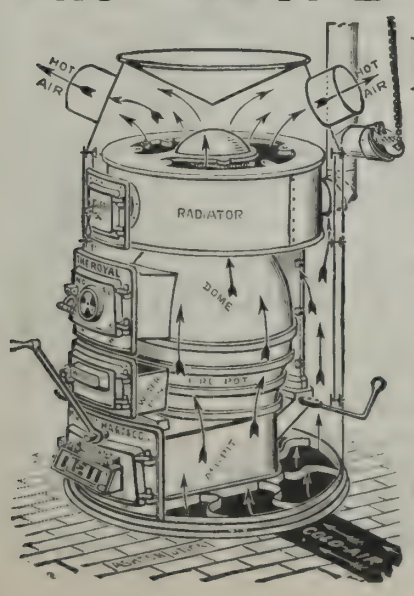
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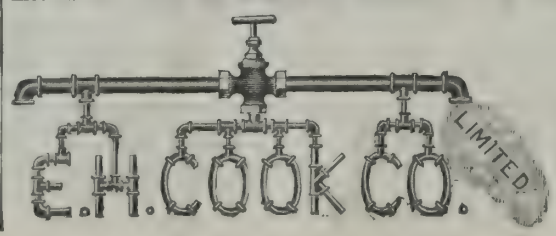
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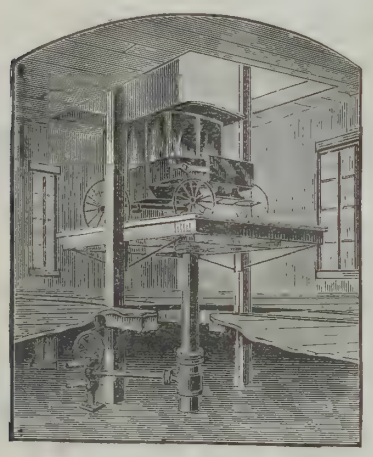


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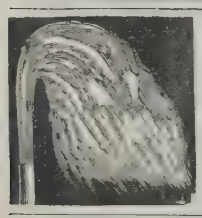
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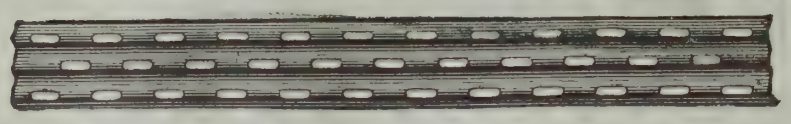
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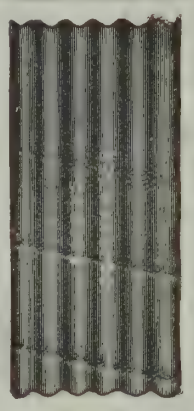
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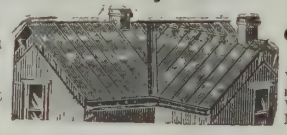


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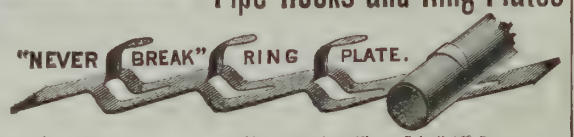
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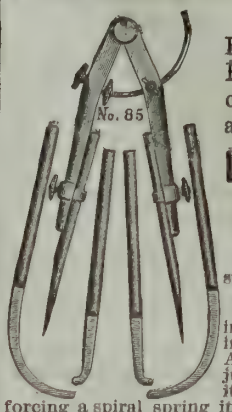
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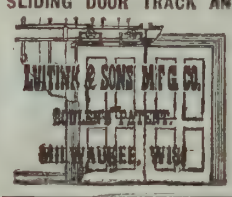
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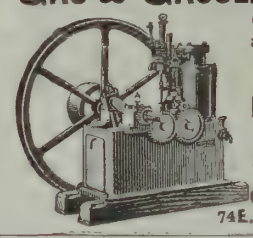
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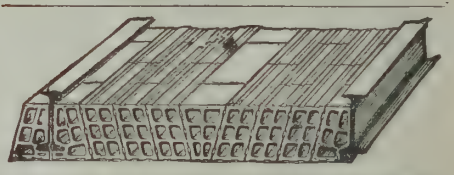
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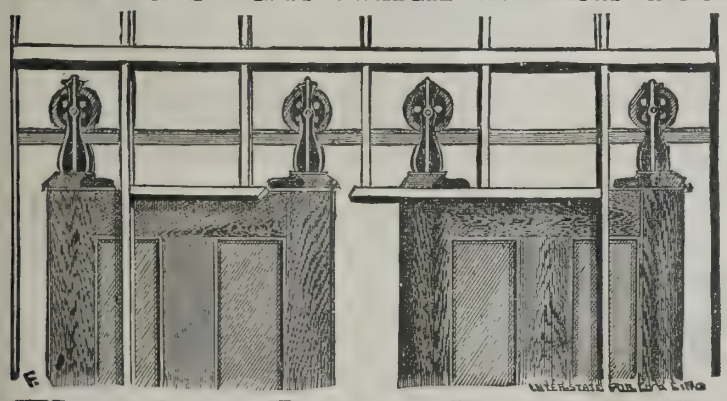
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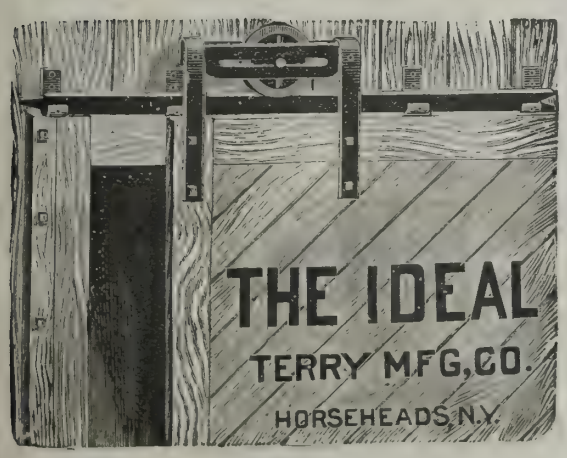
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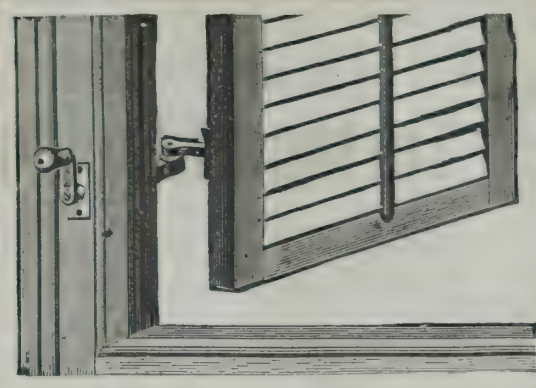
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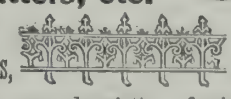
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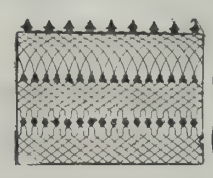
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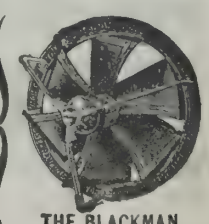
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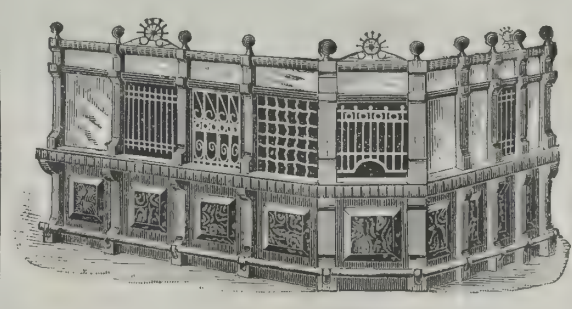
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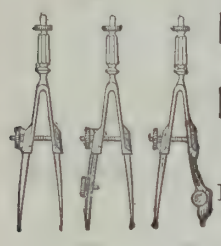
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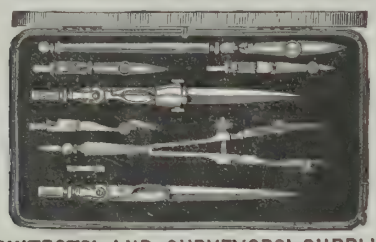
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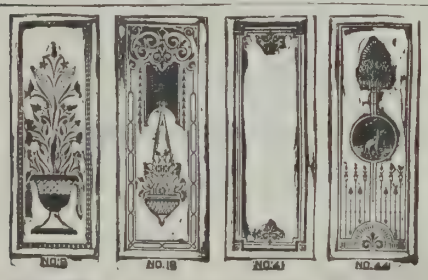
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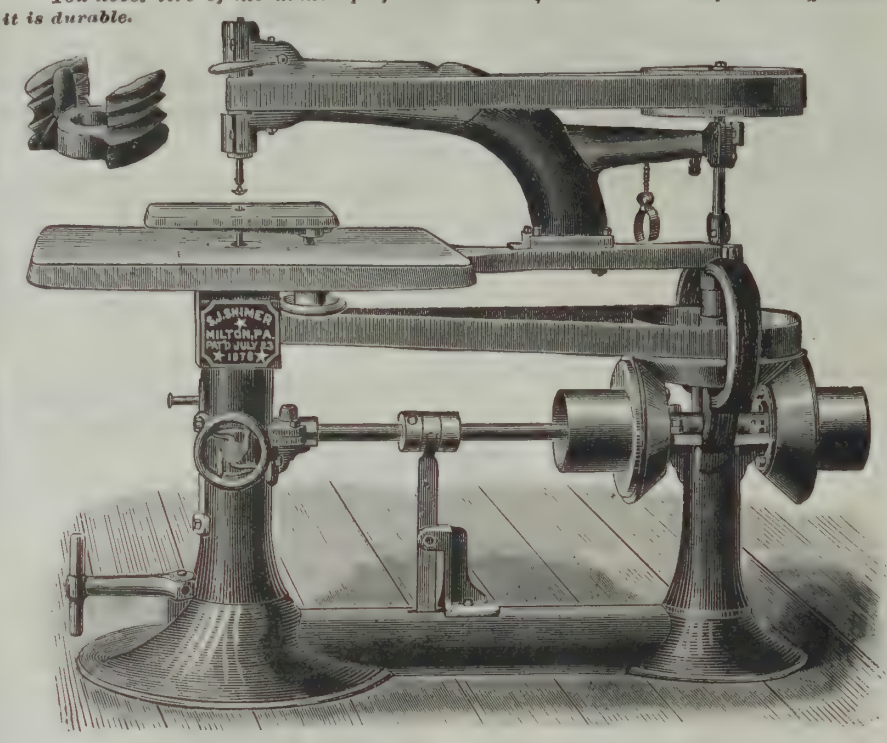


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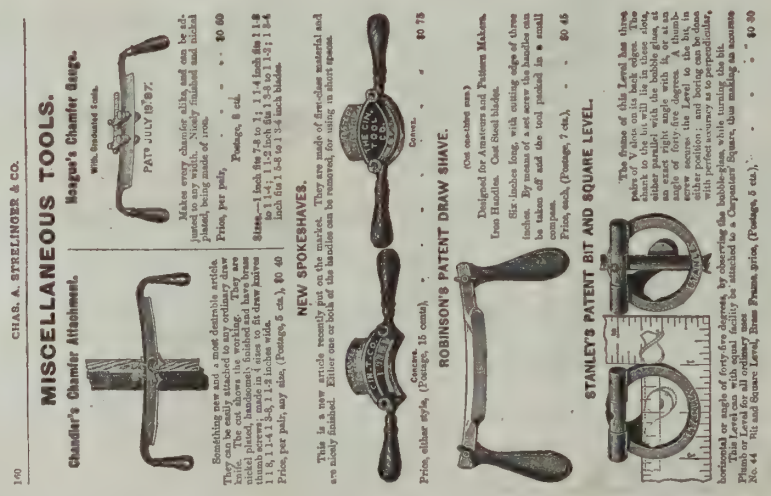
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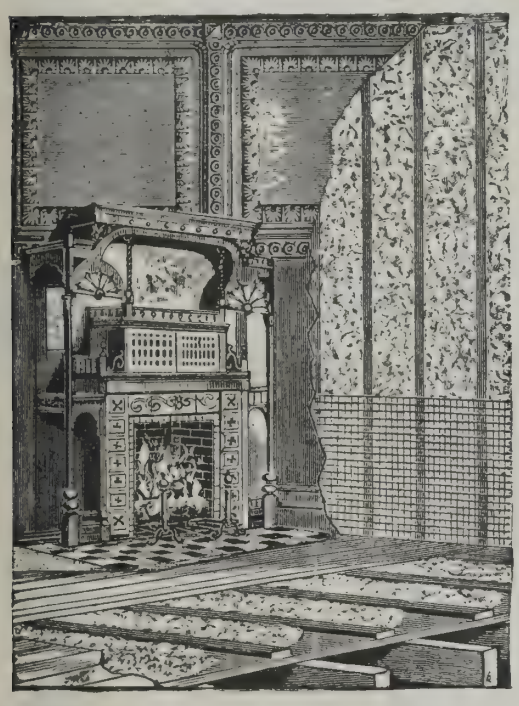
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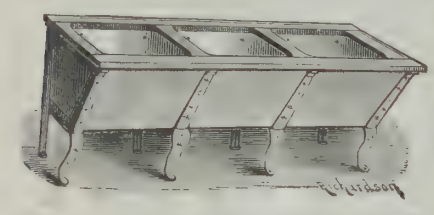
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(1) O. McN. asks: How are crayons, such as those used in the public schools, made? A. By compressing proper materials, such as sulphate of lime.

(2) W. F. O. asks for a recipe for making mahogany stain, something that could be applied to wood without graining. A. Use a decoction of logwood, 2 ounces to the pint of water, containing ½ ounce chloride of barium.

(3) T. J. L. asks: Can you inform me what will take a rust stain out of granite? I have tried oxalic acid, but after seven or eight days the stain returns. A. Try the effect of hydrochloric acid after the oxalic acid has been applied.

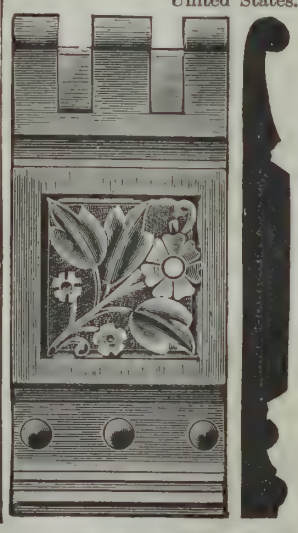
(4) W. H. Y. asks (1) how to make a dark cherry stain of good quality for staining scroll work, etc. A stain that will soak into the wood and not rub off and will take a good finish. A. You may use a suitable aniline color (diamond dye) after working the wood in a bath of Castile soap 3½ parts in water 100 parts, or use a decoction of logwood in vinegar. 2. Also how to obtain a dark finish on oak and ash? A. Inclose in a box or closet with some saucers or plates of strong ammonia. The fumes will darken the wood.

(5) W. J. P. asks (1) why a flash or stroke of lightning in the vicinity of a telegraph line will break the circuit on that line, causing the sounder to work by jerks, notwithstanding the same is held down by a strong battery of four cells. The undersigned, who is a constant reader of your paper, noticed the above phenomenon on a private line, with ground circuit, running from his house to that of a friend's a mile distant. A. When the lightning opposes the action of the batteries, it neutralizes the battery current and releases the armatures. 2. Is there any effectual means by which grass can be prevented from growing up between bricks in the pavement, or which will exterminate it after it has once grown up? A. A solution of common salt in water poured along the joints between the bricks will kill the grass. Chloride of lime is more powerful.

(6) J. C. B. asks: 1. Please inform me of the best way of converting sulphite of lead combined with linseed oil into metallic lead? A. Heat in a crucible with a few iron nails or wire scrap, powdered charcoal and carbonate of soda. 2. And also any book which will treat on this subject. A. Books on assaying, such as Keil's "Assayer's Manual," $3, or on metallurgy, such as Overman's "Metallurgy," $5. 3. Also how to test white lead for the amount of oil contained in it? A. Treat with bisulphide of carbon until oil is all dissolved out, and weigh the residue.

(7) J. J. F. says: There is a diversity of opinion between our engineers in regard to method of holding a high steady pressure with a hot fire. One holds that if any door should be open, it should be the furnace door, as it causes less contraction, and therefore causes least injury. The other, that the flue doors in brickwork should be opened and furnace doors closed, thereby causing less contraction. A. It is the practice among our best engineers to use the chimney damper, the fire door and the ash pit door, with discrimination as to economy and the best regulation of steam. When the engine is running regularly, the damper should do the whole work of regulation for steam pressure. The fire door should only be used for feeding fuel and the sudden necessity of checking steam generating, when engines are suddenly stopped. The ash pit door is not needed when there is a good damper regulator. If there is no damper, the flue door may be used as a regulator, but is not recommended.

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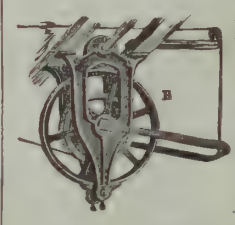
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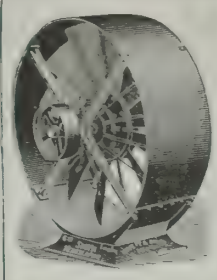
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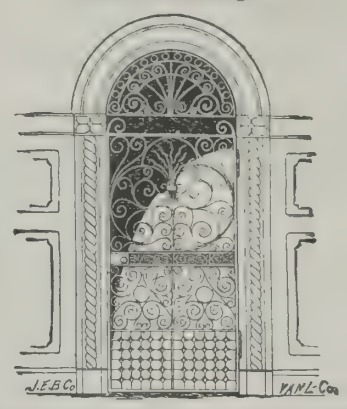
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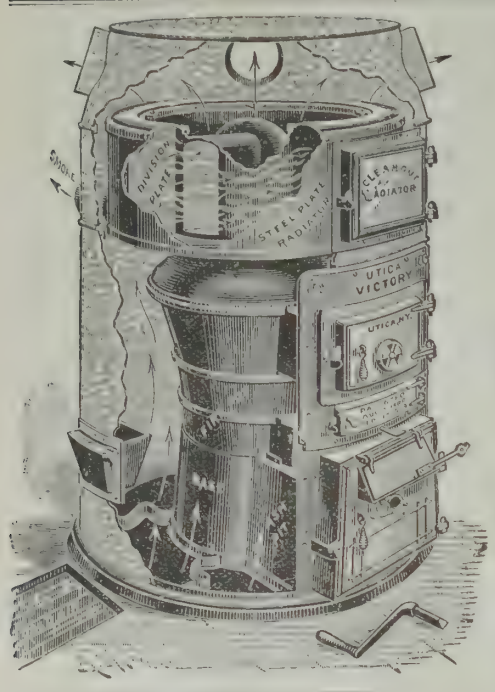


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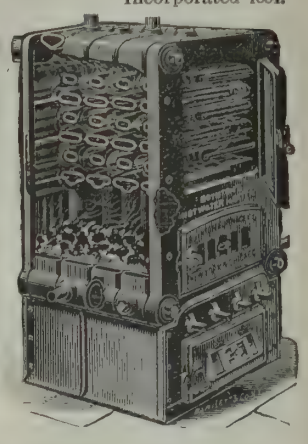
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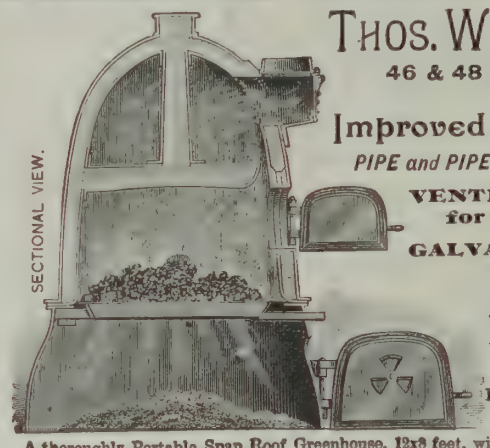
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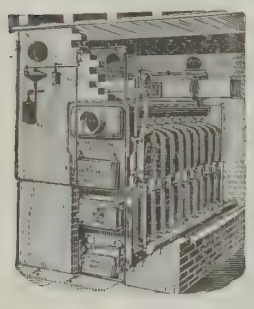
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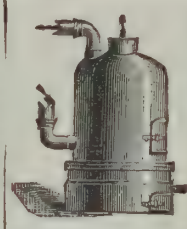
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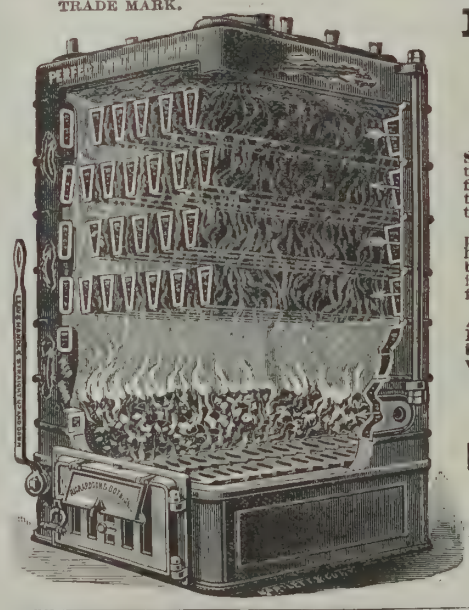
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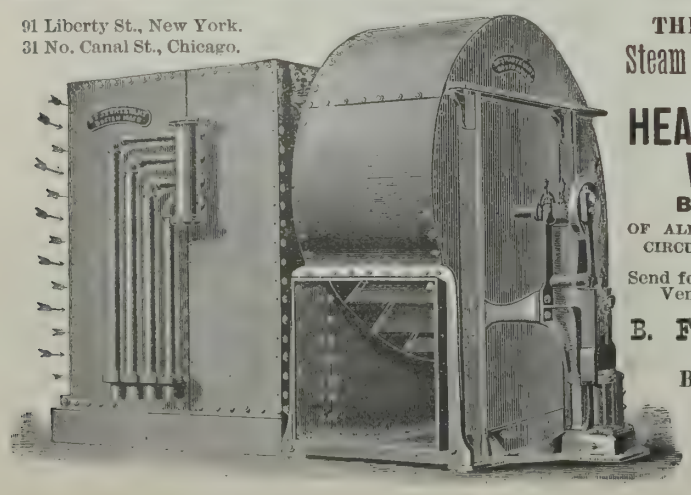
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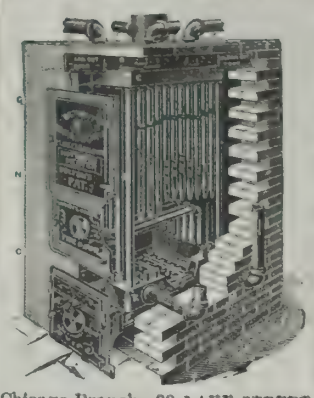
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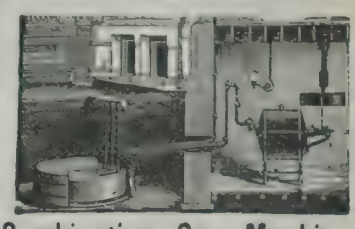
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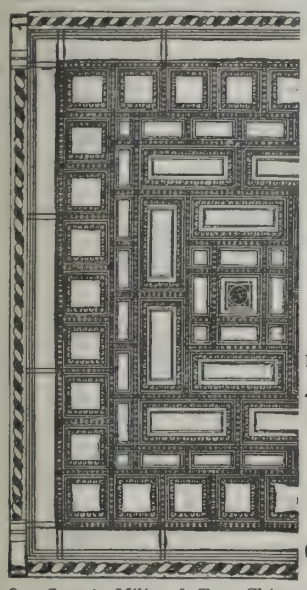


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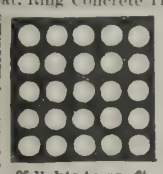
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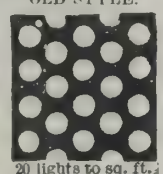
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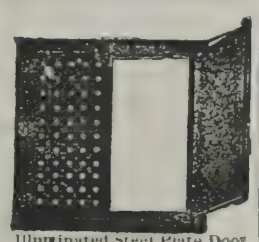
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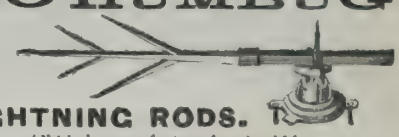
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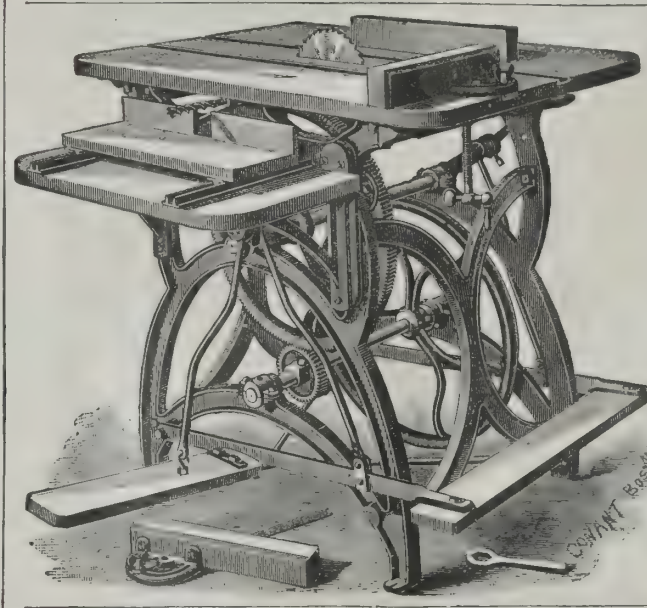


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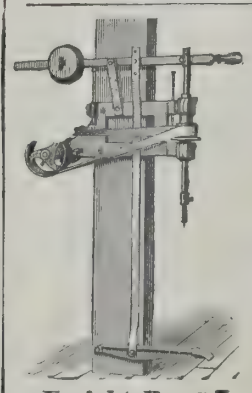
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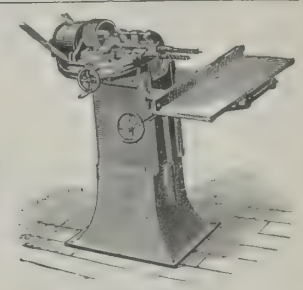
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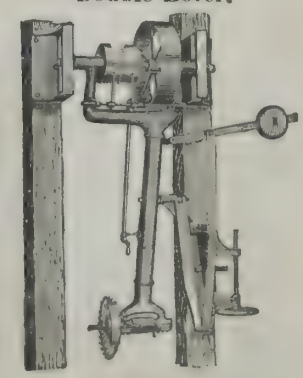
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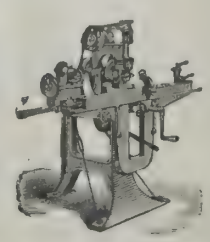
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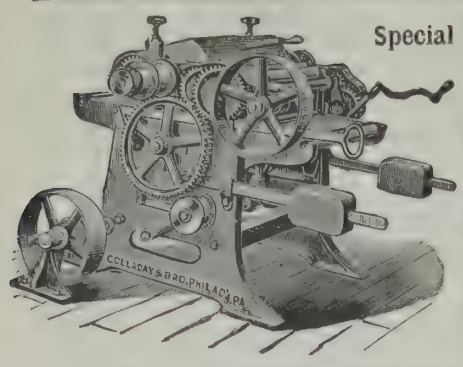


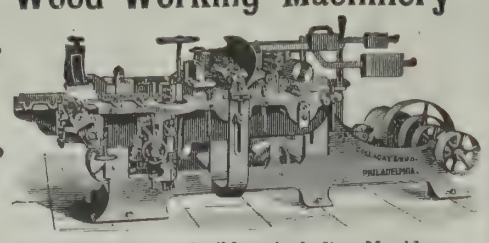
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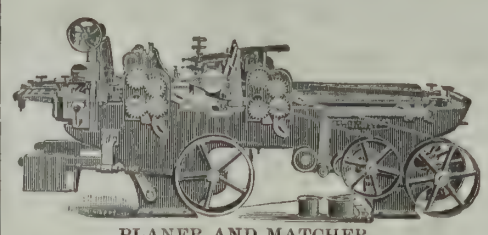




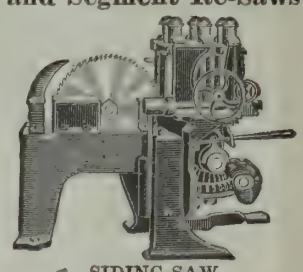
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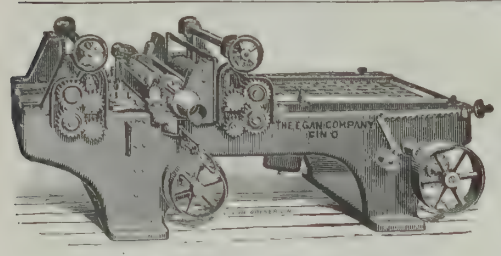


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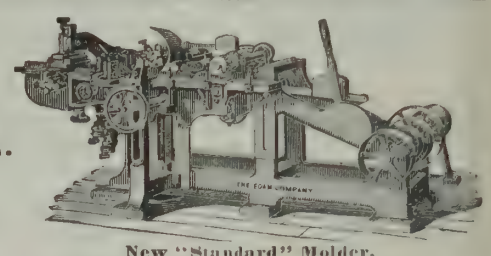
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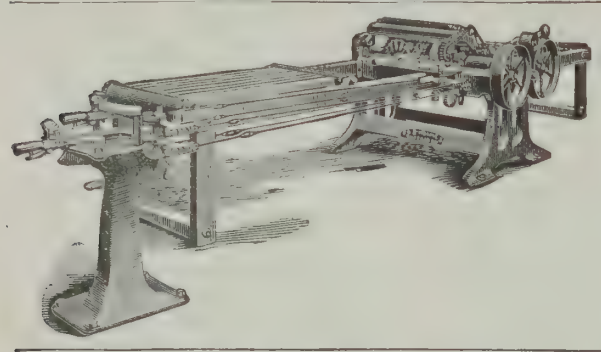
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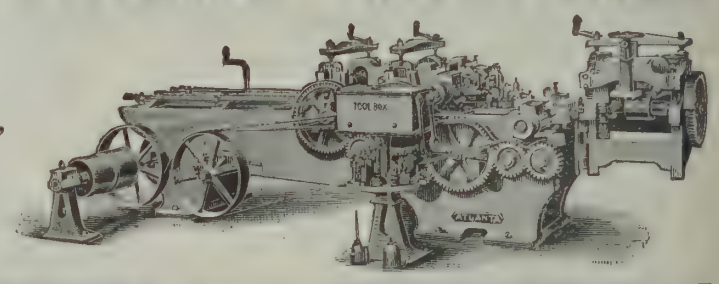
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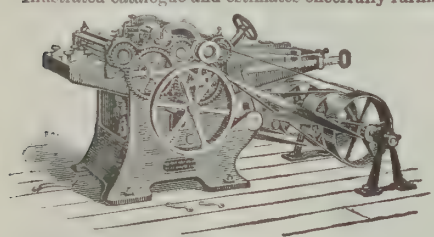


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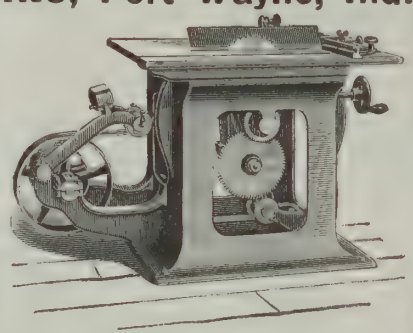
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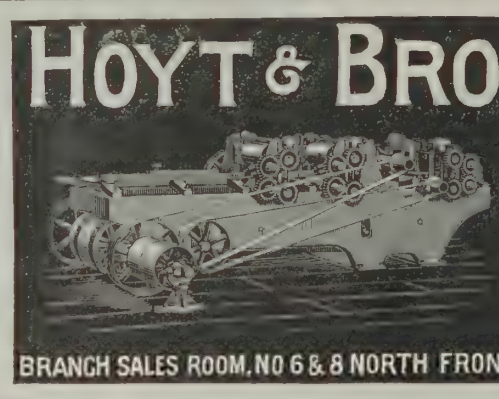
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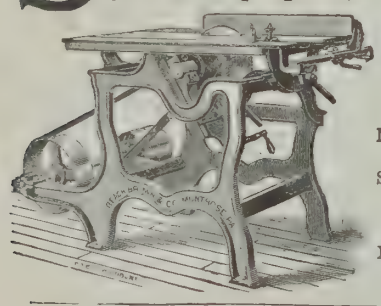
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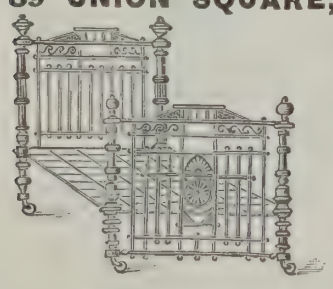
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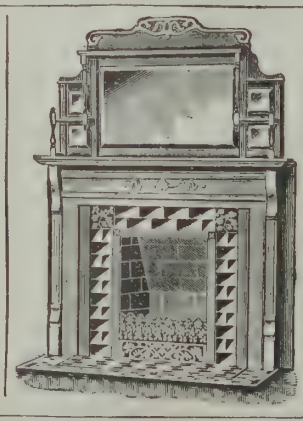
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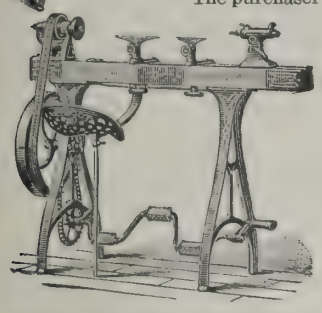
The purchaser can take the complete outfit, or only one or more machines, at a time, as his requirements may demand.



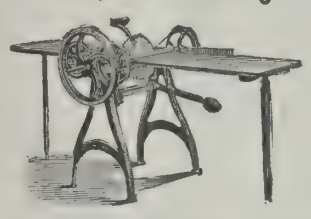
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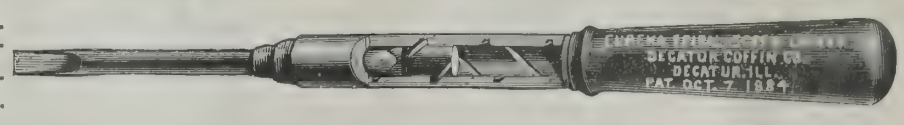
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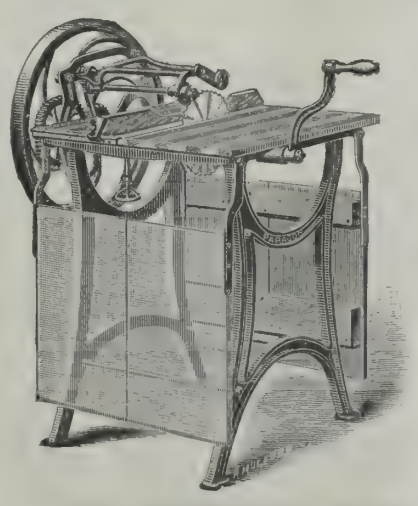


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FOR RIPPING, GROOVING, ETC.

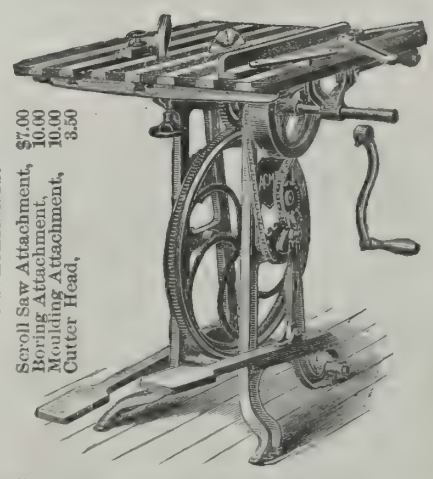
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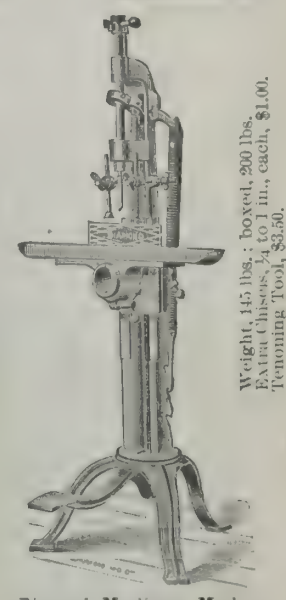
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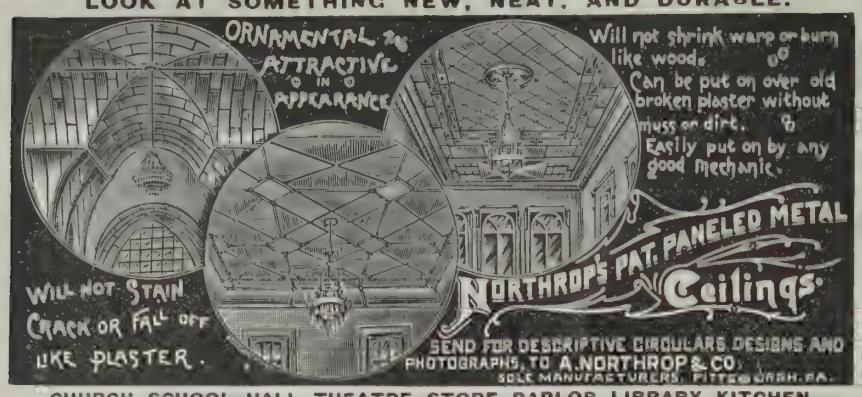
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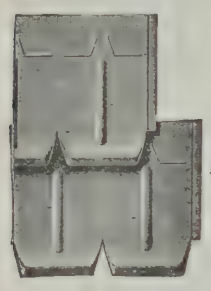
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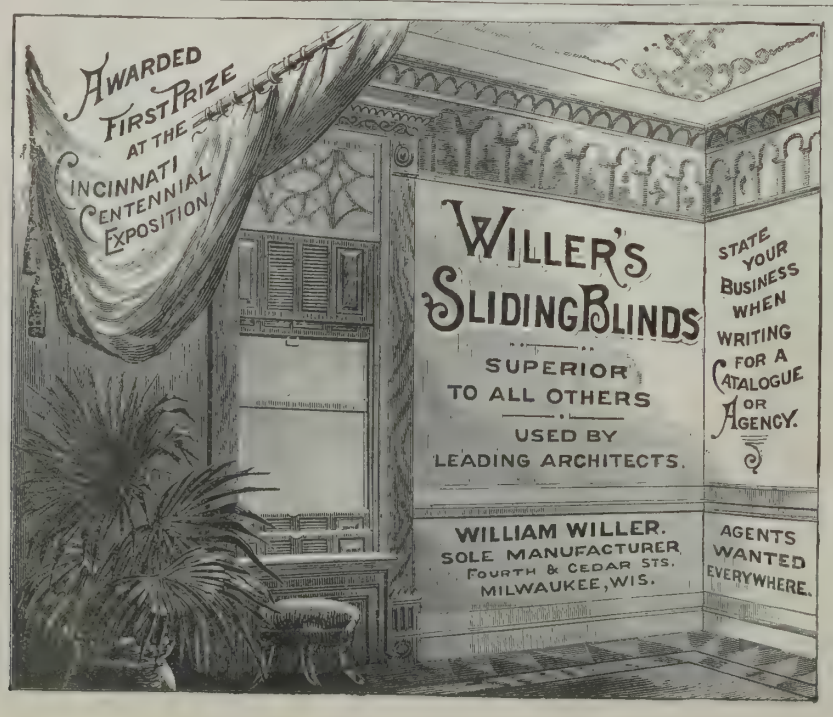
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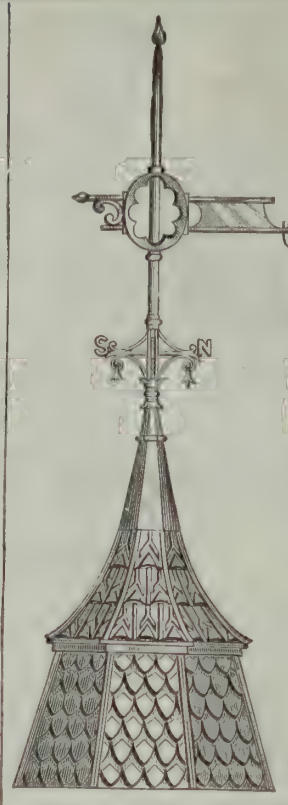
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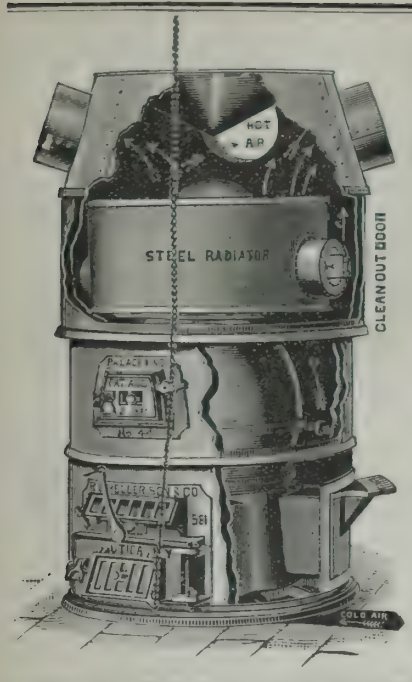
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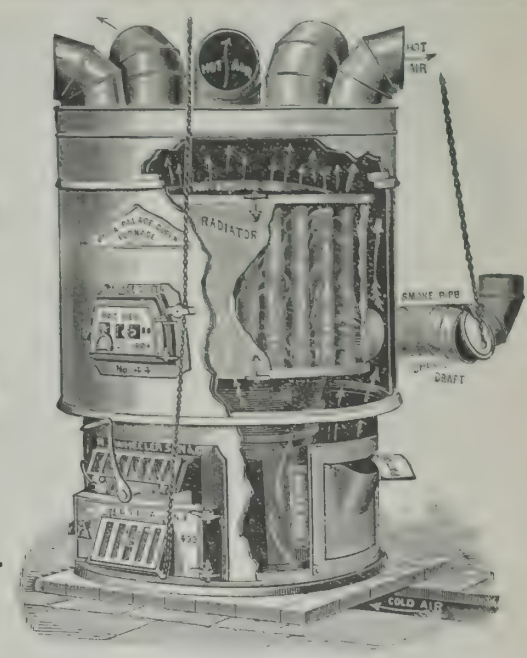
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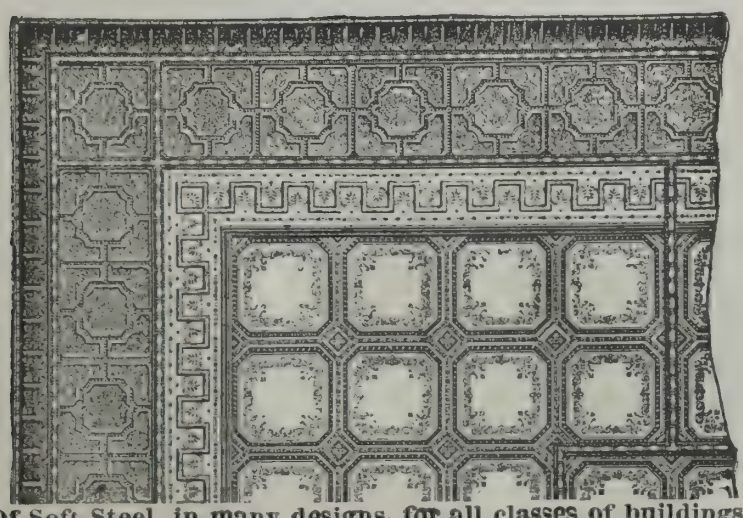
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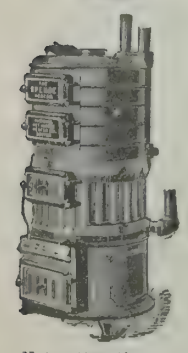
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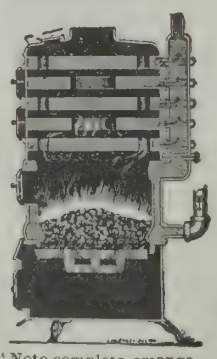
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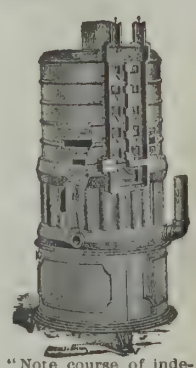
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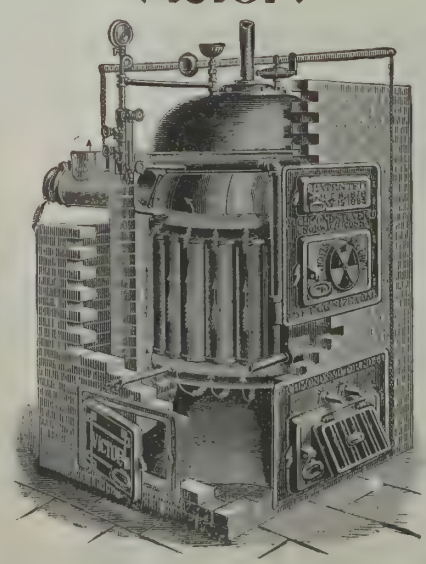
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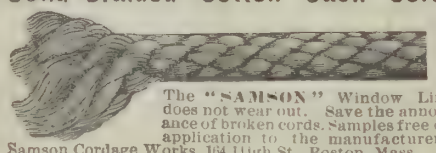
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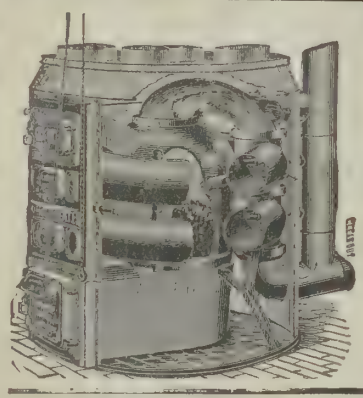
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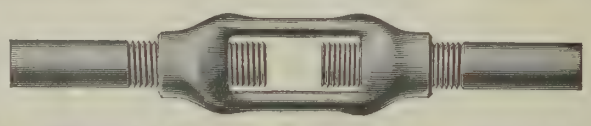
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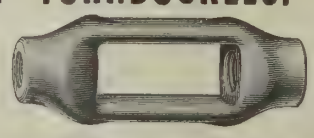
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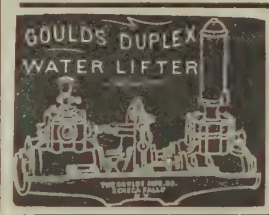
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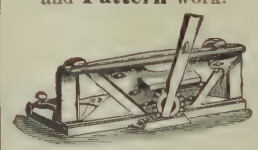
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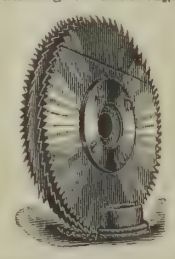
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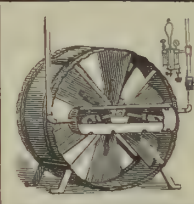
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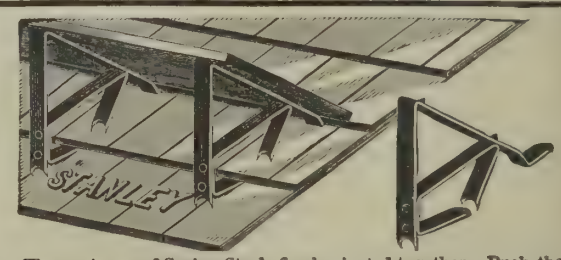
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Entered at the Post Office of New York as Second Class Matter.

ARCHITECTS AND BUILDERS EDITION.

Vol. X. Subscription, $2.50 a Year. NEW YORK, SEPTEMBER, 1890. Single Copies, 25 Cents. No. 3.



AN ARTIST'S STUDIO.—[See page 38.]

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Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors,

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

NEW YORK, SEPTEMBER, 1890.

THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

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This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid **Magazine of Architecture,** richly adorned with *elegant plates in colors* and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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AN ARTIST'S STUDIO.

Our engraving gives a view of the interior of an artist's studio, or, rather, a view of that "corner" of the hall that forms the lodging portion of it, so to speak, and which is shielded against the stray light that streams into the studio through the large window that opens to the north.

Here we find the piano, around which friends gather, and here the artist refreshes himself, after his daily labor, in a twilight favorable for reverie.

Beneath, the platform that divides the studio into halves horizontally is still better protected by tapestry of chateyant colors. This serves best as a resting place and a passageway that communicates with the rest of the apartment. It is reached from the studio by a stairway and a gallery that we see merely the beginning of.—*La Semaine des Constructeurs.*

A RESIDENCE AT HOLYOKE, MASS.

One of our plates in colors represents a residence erected for Mr. A. W. Estleeck, at Holyoke, Mass. Architect, G. P. B. Alderman, same place.

Dimensions: Front, 46 ft.; side, 50 ft., not including piazza. Height of first story, 9 ft. 6 in.; second, 9 ft. Underpinning and first story built of brick, pointed in red mortar. Second story shingled, painted red. with bottle green trimmings. Roof shingled, painted red. The plans show plenty of large rooms. All are well arranged and finished in an excellent manner. Hall, 11 ft. wide, is trimmed with oak, and contains a grand staircase, with a carved newel, etc. Reception room trimmed with ash, is pleasantly lighted by stained glass windows, in dome over. Parlor and library are trimmed with cherry; dining room with oak. Kitchen and pantries are wainscoted and trimmed with white wood, and fitted up in the best manner with all the necessary conveniences. The sleeping apartments, second floor, are trimmed with oak and cherry. Bath room is wainscoted and provided with the best improvements. Fireplaces, where shown, have tiled hearths and hardwood mantels. Cemented cellar contains laundry. Heated by furnace. Three rooms in attic. Cost, $7,000.

Our plate was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN. A sheet of details is given on page 47.

A DWELLING OF MODERATE COST.

One of our plates in colors for this month presents the residence of Mr. W. N. Cary, at Mechanicville, N. Y., on the D. & H. Railway, between Saratoga and Albany. Our illustration was made direct from a photograph of the building specially taken for the SCIENTIFIC AMERICAN. The house was constructed by Mr. Cary, he being a builder, at a cost of $2,500, but in other localities it might cost somewhat more.

The foundation is veneered (above grade) with gray marble laid in ⅜ in. red cement joint. The first story is veneered with brick laid in red mortar. The second story is covered with Granville red slate, rounded corners. The roofs are covered with Eureka unfading green and Old Bangor black slate, put on in octagons and squares. One chimney extends from bottom of cellar. Cornice and frames are painted dark olive green. Sash painted green, almost black. Blinds, sage green. The windows are all two lights, double thick French glass, hung with weights and pulleys, and shaded with Cary's awning blinds. The convenience and varied positions in which these blinds may be used are well illustrated in our plate. For additional particulars concerning the merits of these blinds see the advertisement in another column.

The house is plastered with King's Windsor cement, a preparation much superior to common mortar. The vestibule and reception hall are finished with quartered oak, stair rail and newel to match. All other rooms are finished with pine, Queen Anne style. All doors seven panel, pine stiles and whitewood panels. House heated with furnace. On page 50 we give a sheet of details.

A New Decorative Material.

The newest thing for the adornment of walls and ceilings is "Sutherland's Lace Decoration."

The decoration consists of lace woven in designs of a character suitable for the purpose intended. One advantage which the decoration possesses is that it can be woven the entire width of the wall it has to be applied to, and in one continuous length to cover the whole room.

We recently inspected a room hung with this material, and were so charmed with the result that we give a description of it for the benefit of our readers, some of whom may be wishful to avail themselves of the opportunity it gives of introducing a novel and beautiful decorative effect.

The room in question was a large drawing room, some 30 ft. × 18 ft., and lofty in proportion. The wall was divided into two by a deep frieze and high filling, or dado.

It will interest our readers to follow the process of application and decoration from the beginning, so we will start from the foundation, so to speak. The wall is first hung with a lining paper (the joints butted), which is painted with one coat of oil paint, and is then ready for the lace.

In fixing the lace we get the center of the wall, and strike a chalk or charcoal line down it, then we take the fabric, which, in material, is simply the same as an ordinary lace curtain, and center it on the center line of the wall; now take some long wire nails 1½ in. long, and pin the lace on the top edge, in the center of the wall; now stretch it right and left of the center nail, driving in nails to stretch it along the top edge, until the lace is left suspended on a row of nails. We now commence to tighten it *downward*, gently pulling it, and securing it with nails at the bottom, just above the skirting. It is necessary to do this with care, so as to keep the pattern straight, and yet taut. Up to this point the lace is simply hung on the pins. Our duty now is to secure it to the wall, and this we do with a strong solution of size which is applied with flat brushes, *well worn*, so that the bristles are stiff, and will push the size well into the interstices of the pattern. Care must be exercised in doing this, or the pattern will become distorted—the proper way is to work from the center, right and left, seeing that every inch of the surface is well covered with the size, and that no blisters or blobs are left in the wall.

The work is now allowed to stand until the size is dry, when we proceed to "ground" it in. We can get several effects—we may work a light pattern on a darker ground, or, *vice versa*, a dark pattern on a lighter ground. We will assume the former is our intention. In the room we inspected, the finish was a creamy yellow on a reddish yellow ground. The ground is painted in oil, one coat only, and the color was made from lemon chrome and vermilion, with white. The pattern color was lemon yellow, and was mixed in the ordinary way of flatting—only on the stiff side.

The next process is to apply the color on to the pattern of the lace, leaving the ground the original color; this, as any practical decorator knows, can only be done by rolling it as a flock paper is rolled; the projection of the lace is sufficient to protect the ground, and the pattern is developed in the lighter color. The fine threads of the groundwork of the lace, and the broader, closer masses of the parts of the pattern, introduce a great variety of shade, which is very agreeable to look upon, and imparts a depth to the surface which entirely relieves it of any mechanical appearance. The decoration may be carried to a still further point, if it is so desired, by the glazing of portions of the pattern with a thin wash of transparent color, touched in with a fitch.

The raw material is very reasonable in price; and, in this age, when novelty is so much sought after, it is not the least recommendation of the decoration that it breaks new ground, and provides a client with a theme to discourse upon.—*Journal of Decorative Art.*

Stuck to their Seats.

When the contribution plate was passed at the dedication services of the new Congregational church at Moorland, Iowa, on Sunday, July 27, not a single person arose to leave his seat. The reason was because the varnish on the seats was not sufficiently dried, and the entire congregation found itself tightly glued down. At the close of the service it took three-quarters of an hour to free all of the prisoners. The handsome toilets of the ladies were ruined, and large portions of them decorated the newly painted pews.

ACCORDING to the *American Architect,* the best ordinary process to arrest decay in sandstone consists in saturating the stone as deeply as possible with a solution of silicate of soda, followed by a solution of chloride of calcium. The double composition leaves the pores of the stone filled with silicate of lime, the chloride of sodium washing out. The application of the process requires care, and some experience. The solutions should be applied very weak, and several times, at intervals, alternating the soda and lime solutions. If the silicate of soda solution is too strong, it will form a gummy coating, which will prevent the penetration of the subsequent solutions, and will effloresce later, spoiling the appearance of the stone.

IN connection with the publication of the BUILDING EDITION of the SCIENTIFIC AMERICAN, Messrs. Munn & Co. furnish plans and specifications for buildings of every kind, including Stores, Dwellings, Carriage Houses, Barns, etc. In this work they are assisted by able and experienced architects. Full plans, details, and specifications for the various buildings illustrated in this paper can be supplied. Those who contemplate building, or who wish to alter, improve, extend, or add to existing buildings, whether wings, porches, bay windows, or attic rooms, are invited to communicate with the undersigned. Our work extends to all parts of the country. Estimates, plans, and drawings promptly prepared. Terms moderate. Munn & Co., 361 Broadway, New York.

ARCHITECTURAL SKETCHES IN BRADFORD, ENGLAND.

The chief architectural feature of the town is the Town Hall. It stands on the site once occupied by the "Old Bowling Green Inn." When it was opened in 1873, the event was celebrated with great ceremony. It is right in the middle of the town, the principal streets leading up to it, and the tower forms a very striking feature in the center of Market Street, the chief thoroughfare. Its position is very advantageous, presenting as it does different views from all the main streets. The site is triangular in form. There is no large hall in the building, if the council chamber—a very fine room—is excepted, a large hall not being required, as the townspeople already possess a most commodious one in St. George's Hall, which can hold 4,000 people.

The interior of the Town Hall is entirely devoted to the purposes of the municipal offices of the borough, and for purely business purposes, including the borough court and police station. The ceilings of the court of the council chamber are elaborately decorated with gold and color, the panels of oak being painted with emblematical figures. The principal front in Market Street is broken by projecting gables at each end, and by the center entrance gable, and the clock tower rising immediately behind it. The second floor is divided into canopies between the windows, and also in front of the buttresses and pinnacles, and these receive statues of the kings and queens of England from the conquest to the present time, thirty-five statues in all, executed in the same stone as the building — white freestone from Cliffe Wood quarries—and each is seven feet high. Topping the clock tower is a belfry with thirteen bells, the largest weighing four tons. They strike the Cambridge quarters, and also play tunes every four hours, by three barrels of seven tunes each. Their sweet tones present a delightful contrast to the shrill whistles of the mills.

Bristling though it does with tall mill chimneys, Bradford is not satisfied. It pierces its often murky air with many towers. One of these surmounts the Technical School, perhaps the most completely fitted technical school for local manufactures in the country. During the winter season about a thousand students attend. The school is an imposing edifice, in the Venetian type of Italian architecture. It contains a public hall, class rooms, museum, library, and workshops for the dyeing, textile, and mechanical departments. Provision is made for evening classes to afford a sound commercial education, and to teach languages, shorthand, etc., to pupils engaged during the day.

The people of Bradford themselves are brisk and bustling. They all seem to take a lively interest in their town. They are keen to see what will advance its interests—of this the technical school is witness—and have a well deserved reputation of being shrewd, capable business men. Empty as the streets seem during the day, at night they are crowded with the workers from the mills and the employes of the numerous warehouses who are close held during the day. Credited with being nothing more than a huge weaving center, Bradford is really full of historical and antiquarian interest. It has had a stirring history, and it is due to the indomitable pluck of Yorkshiremen alone that it has taken so large a share in British commerce. — *London Daily Graphic.*



THE TECHNICAL SCHOOL, BRADFORD.



THE TOWN HALL, BRADFORD

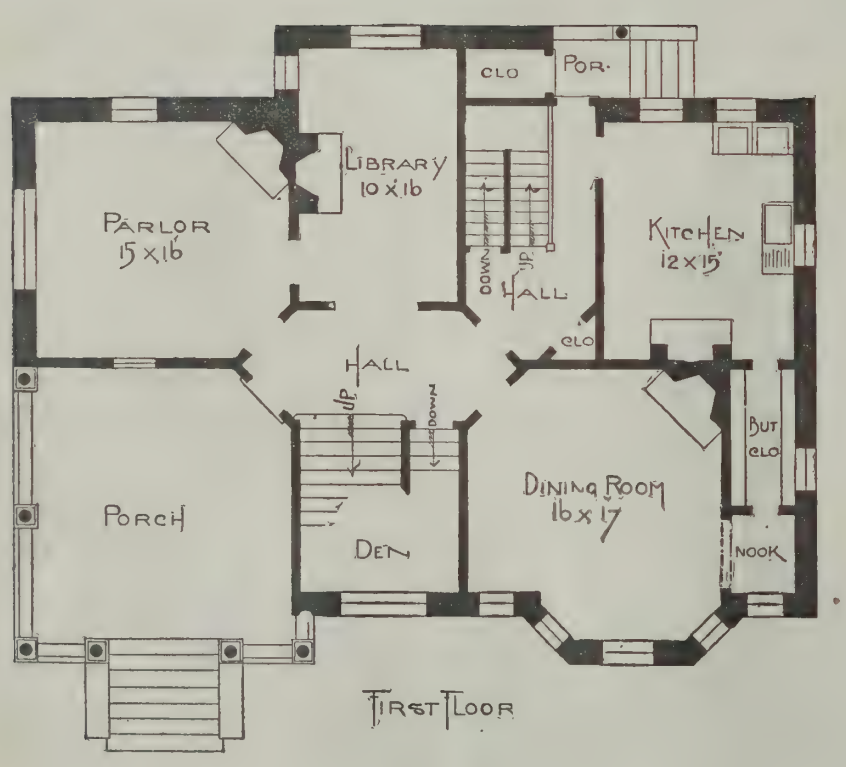
Independent Homes.

There is no more significant and hopeful sign pointing to the stability of our social and political fabric than the general tendency of the working and salaried classes toward the acquisition of realty in the form of town lots and houses. It is a feature of material development in later years that, in a large measure, offsets that other tendency which many thoughtful people deplore, the inclination of population to get away from rural life and concentrate in the cities. It is a means by which people who have drifted or grown into the condition of wage workers, as distinguished from the capitalistic class, seek to become in a degree independent of the vicissitudes that attend their condition It is a way in which the laborer, mechanic, factory operative, clerk or bookkeeper can save a portion of his income and salt it down, as it were, where it will keep and be a resource in time of need. It is a method that converts thousands into property owners who would otherwise be dependents, subject to charity whenever loss of employment or other misfortune came upon them. It fosters a desire for home owning, and therefore conduces to good citizenship and patriotism. It is directly counteractive of socialism, anarchism, profligacy and vice It conduces to respect for law, order, decency, temperance, and virtue. It is wholly beneficial in whatever aspect it is viewed. Under our laws, which are based on the British system, a freeholder is the peer of the wealthiest man in the country, if his holding be but a 22 foot lot with a six room cottage on it. He has castled rights equal in peculiar kind to those of the individual who lives in a mansion that may have cost half a million, and the lot and house owner feels this in a degree that has a powerful influence on the strength of his character.

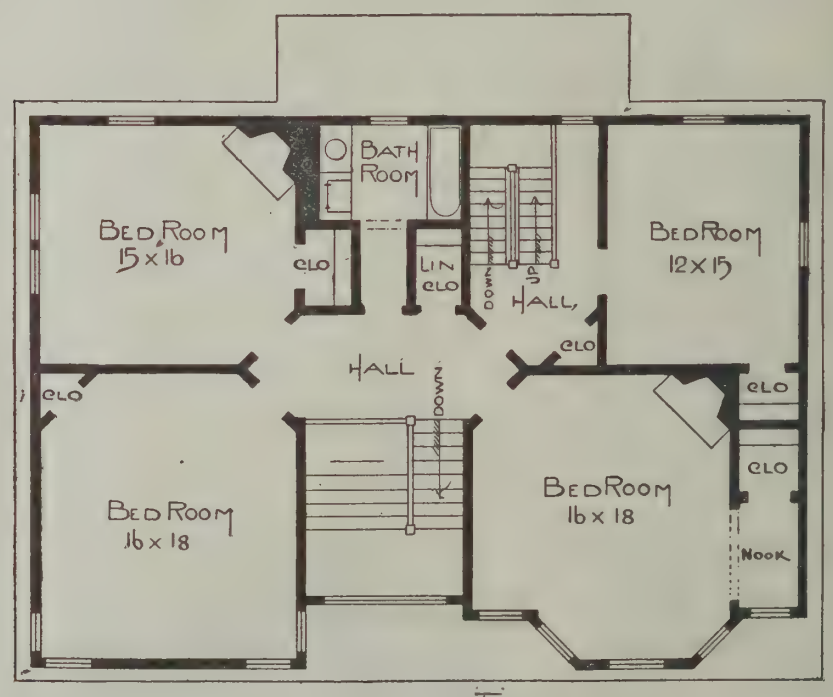
Building associations have greatly conduced to the home-owning idea. Starting mainly in Philadelphia many years ago, they have, within recent years, become common in all the cities and larger towns of the country. Such has been the increase of these institutions that they have almost become a rage. They are urgent incitements to the saving of a portion of the wage earner's income. Millions of people in this country would not to-day be the possessor of a dollar's worth of property if it were not for building associations. They have not only accomplished much directly in determining savings into real estate investment, but have, through competition, compelled land sellers, money lenders, and building investors to adopt the monthly or other gradual payment plan in the development of their properties. Thus all who receive wages for their services have been enabled to use accumulated capital for the procurement of homes.

The development of the lot and house owning movement has greatly conduced to the expansion of the area of cities and towns. Home buyers among the wage-earning classes must have cheap lots. In order to get them they must go outside the central portions of cities, to where settlement is thin and areas ample. Modern means of intramural transit, like suburban service on the steam railways, horse, cable, and electric cars, and elevated railways, have brought distant districts into convenient relation with centers of business and manufacture. In all the outlying parts of cities of the larger class, and in the suburbs, the growth of settlement and population has been enormous within the past ten years. The building of thousands of houses has been a direct benefit to the lumber trade, for structures of the cottage and villa order are in the vast majority of instances built of wood. The feature of urban and suburban growth indicated is but a beginning of what is to be seen in future years. Population will continue to flow from the country and foreign parts into the cities, while the process of spreading out, under the stimulus of the desire to own homes, will enlarge. This prospect opens out a wide view to the lumber dealer. He can count on a steady increase of demand for years to come. This should be taken into account in making future market calculations. —*N. W. Lumberman.*





FIRST FLOOR

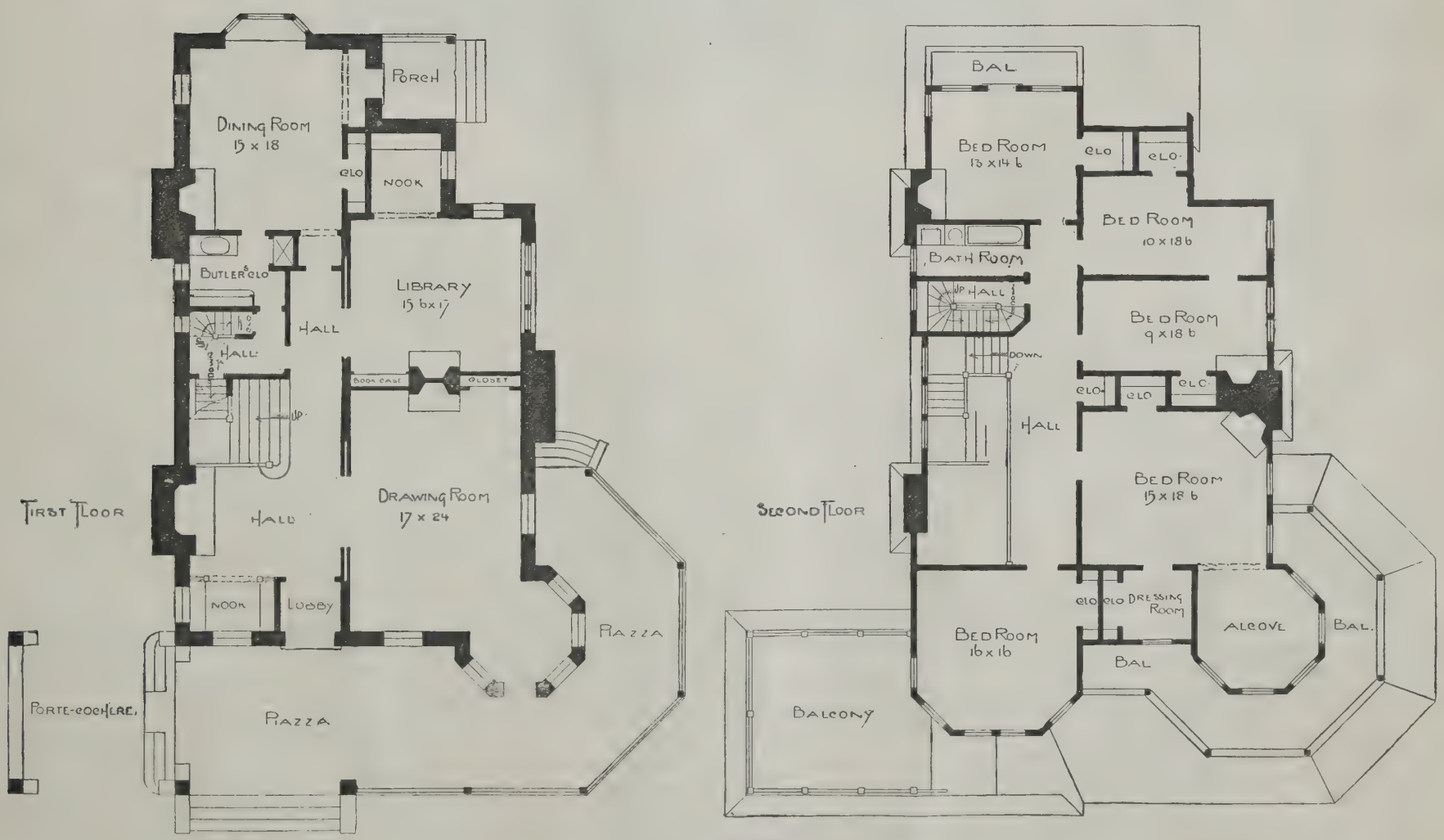


SECOND FLOOR

BOSTON PUBLIC LIBRARY

A RESIDENCE NEAR NEW YORK.—[See page 46.]





A RESIDENCE AT SHORT HILLS.—[See page 42.]

A RESIDENCE AT SHORT HILLS.

We present below and on page 41 engravings and plans of "Redstone," the residence of W. G. Russell, Esq., at Short Hills, N. J.

The elevations are very attractive, and the plans excellent, the latter showing plenty of large rooms that are fitted up in elegant style. Lamb & Rich, New York, architects.

Dimensions: Front, 43 ft.; side, 68 ft., not including the 15 ft. piazza. Height of ceilings: Cellar, 8 ft. 4 in.; first story, 10 ft.; second, 9 ft. 6 in.; third, 8 ft. First story and columns to porte-cochere and at entrance are built of dark red freestone, natural rock dressed. Second story covered with cedar shingles painted red. Lobby has a tiled floor. Hall trimmed with quartered oak, has a paneled wainscoting, ceiling beams, and a large open fireplace built of stone similar to the exterior, and ornamented with terra cotta panels; hearths laid with brick. The principal feature is the staircase with carved newels, posts and balusters. This staircase, upper and lower halls, are pleasantly lighted by three large stained glass windows. Floors are of oak and cherry, laid in narrow widths. The drawing room and library are trimmed with mahogany, and each is provided with large open fireplaces, with tiled hearths and facings, and elaborate carved mantels of rich mahogany, with plate glass mirrors, etc. Library contains nook, with seat and a bookcase built in. Dining room is finished in "Old English style," and is trimmed with quartered oak, and contains an open fireplace similar to the ones already described. Butler's closet and servants' hall are complete. Second floor contains five bed rooms, trimmed with hardwood, and furnished with large, well fitted up closets, also bath room, wainscoted and furnished with tub, bowl, and closet complete. Three bed rooms and trunk room on third floor. Cellar contains kitchen, 14 by 18, laundry, servants' hall, furnace, and coal cellars, all complete in their various appointments. Speaking tubes, electric bells, and all the modern conveniences are provided. Cost, including interior decorations, about $25,000.

Our engraving on page 41 was made direct from a photograph of the building taken especially for the Scientific American. The view given on this page shows the opposite side of the house to that given on page 41.



A RESIDENCE AT SHORT HILLS.

Good Planning.*

BY T. MILLARD READE, F.R.I.B.A.

Good planning does not mean simply the disposition of the rooms and approaches on a horizontal plane; their vertical disposition and relative levels are of quite as much moment. Good planning means the utilization of every square yard that your building covers, without waste. And this applies not only to trade buildings in a crowded city, but also to public buildings, when the architect has ample elbow room. A good plan is always distinguished by a certain simplicity and ease. The better the plan, the more obvious it will seem that the architect's arrangements are those that would have commended themselves to any one. In planning, as in other arts, the greatest art is the concealment of it; that is to say, it should be like nature, that never exhibits conscious effort.

Not only is good planning apparently effortless, it is more; it is the foundation of picturesqueness. There are really very few cases where a symmetrical arrangement is the one best suited to the requirements of a building, but where it is, then adopt it. Buildings deliberately planned for picturesqueness are toys, or constructed paintings, whereas a picturesqueness that flows naturally out of the plan is a never-ending joy. It may be that a plan on the face of it may seem to be devoid of picturesque elements, but the vertical planning may be made to secure a pleasing and broken outline.

Though the plan is the foundation of a design, yet when it is settled in its various features, the plans of the various floors, the sections, and the elevations should grow together as an organic whole.

Architectural design is like a game of chess, the man who sees the greatest number of moves in advance is the better player or planner. After certain preliminary meditations on a blank sheet of drawing paper and a few crude trials, the idea of the building begins to take shape, and when that and the main features are grasped, the details grow with astonishing rapidity.

The conception of the building then takes concrete form, and for those who have not time to work out all the parts in detail, it is quite possible to convey the ideas to others who have. To be enabled to perform this very important function of conveying to other minds the ideas in one's own, it is necessary, I need hardly say, to have sufficient knowledge to be able to do all the work without aid, if necessary. I find myself that it is possible to settle every important point of a plan, even to very accurate dimensions, with a comparatively few leading lines; and to know what work it is essential for the principal to do himself and what to depute to others is a very important acquirement in these times of railroad speed. As, I suppose, every one has found out for himself who has practiced design that there are times when a plan obstinately refuses to yield to any analytical power mind may be able to bring to bear upon it at the time. Some problems seem absolutely insoluble. The only remedy in such cases, I find, is to sleep upon it, and then the solution often presents itself voluntarily and without effort, but I have known a bad case to last as long as a week.

It is said that "to him who can wait, all things are possible." And this seems partly applicable to planning; the misfortune of it is, that often we cannot wait, and in such cases something inferior has to be put up with for the time being.

Planning is a creation, and governed by geometrical possibilities. The man who has the most invention and can carry out combinations of form with mental readiness, who, when met with difficulties, can, by ingenious arrangements, overcome them, who has that grasp of the conditions of the problem and can fit all the parts together in such a way that administration can be carried on with the greatest economy of labor, who gets the best possible light for each apartment and from the right direction according to its use, who so arranges his building that full advantage is taken of the aspect, and who, considering throughout that the object of a building is use, has full thought for the health and comfort of the occupants, that man is the ideal planner. But to carry out such an ideal demands an immense amount of varied knowledge, architectural and physical. He must in the first place have studied and be familiar with the methods of ancient practice and the best methods of contemporary architects.

He must understand the physical principles upon which modern systems of drainage and ventilation are founded, be familiar with mechanical ideas and ready in the application thereof, and when all these attainments are embodied in one mind, the foundation of a good architect is made. But why the foundation only? Does it not seem that in these multitudinous acquirements we have the whole architect, body and soul? Body certainly, but not exactly soul. In fact, it would be impossible to make a good plan, architecturally speaking, without possessing something not included in this list of qualities. I doubt indeed if a well-balanced plan could be produced by any one not possessed of considerable artistic susceptibility. The artistic, the poetic must be added, the planner must have a ready conception of the possibilities of his construction from an architectural point of view, if he is to work out a satisfactory *ensemble* which will prove a lasting joy to future generations.

* From the presidential address to the Liverpool Architectural Society.

Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. Munn & Co., 361 Broadway, New York.

Different Clays.

ALUM CLAY.

A large quantity of clay is sold every year to the manufacturers of chemicals, for making alum. A rich clay is needed for this purpose, but those containing lignite or pyrite, which renders them inapplicable for refractory materials, do not spoil them for this use. Alum is made by digesting the clay in sulphuric acid, which forms sulphate of alumnia, then dissolving out the latter salt from the silica and other impurities, and forming it into alum by the addition of the necessary salt of potash, soda, or ammonia, and crystallizing out the alum.

PAPER CLAY.

Clay which is pure white, and that also which is discolored and has been washed to bring it to a uniform shade of color, is used by the manufacturers of paper hangings, to give the smooth satin surface to the finished paper. It is used by mixing it up with a thin size, applying it to the surface of the pieces of paper, and then polishing by means of brushes driven by machinery. The finest and most uniformly colored clays only are applicable to this use, and they are selected with great care. Clay is also used to some extent by paper manufacturers, to give body and weight to paper.

FULLER'S EARTH.

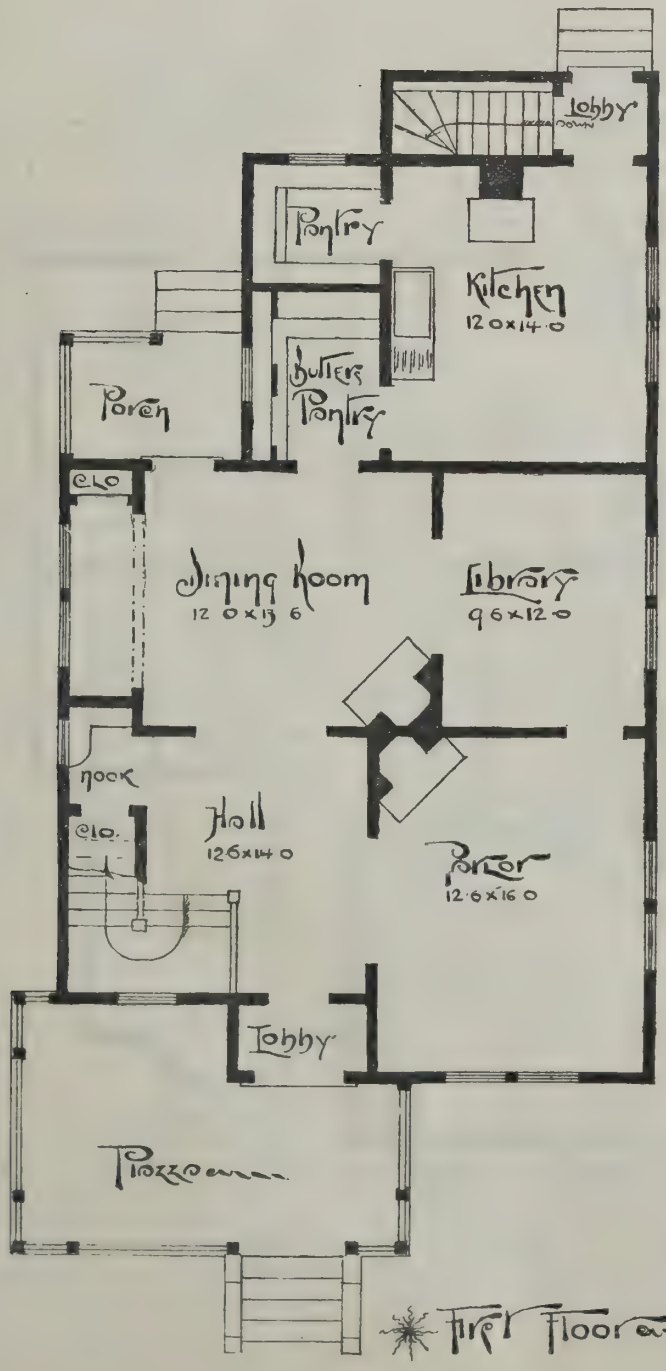
Fuller's earth is an unctuous sort of clay, much of it kaolinite, useful in fulling cloth from its property, common to aluminous earths, of absorbing oil and grease. The variety of clay is prepared which falls to pieces when put in water, making a slight cracking sound. Its colors are various shades of yellowish, greenish, bluish brown and gray; [luster dull, but appears greasy when rubbed. It is not now esteemed of as much value as formerly, soap having taken its place. In England it used to be so highly valued that its exportation was prohibited by law. When used it was first dried in the sun or by fire, and then thrown into cold water. The powder thus formed was sorted, by washing, into coarse aud fine qualities, the former of which was applied to inferior, the latter to superior cloths. —*Brickmaker.*

Building Liens.

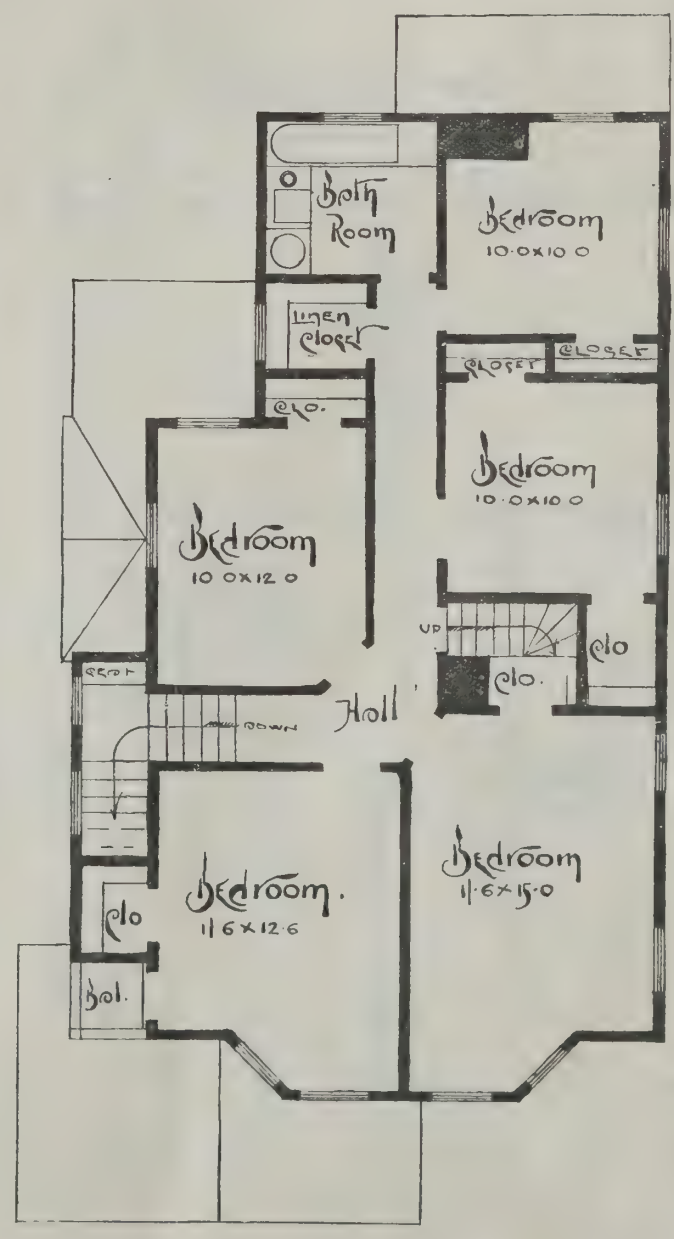
A rather important decision has just been rendered by the Supreme Court of Pennsylvania in regard to mechanics' liens. It seems that it is common in building contracts in that State for the contractor to agree not to file mechanics' liens against the estate. The question to be decided was whether this prevented sub-contractors, under the general contractor, from filing liens, in case they were afraid that they might not otherwise get their pay. The decision of the Supreme Court is that such a stipulation in the agreement of the general contractor cuts off the right of sub contractors to enter liens. In the language of the court, "Sub-contractors are bound to do just what their principal was bound to do, because they assumed to perform his contract with the owner, to the extent of their undertaking, and, of course, they must perform according to his limitation." This is in accordance with the legal principle that sub-contractors "cannot have the benefits of the builder's contract without accepting the conditions upon which those benefits are conferred." No doubt every one will acknowledge the justice of these remarks, but persons of a reflective turn will notice the curious contrast between such legal deductions and the whole system of mechanics' liens, which consists simply in the issuing of a piratical license to carpenters, plumbers, bricklayers, and other building workmen, to fall upon an innocent owner, and extort from him money due them from some one else, whenever they take it into their heads that it would be less troublesome to collect it from him than from the real debtor. As to the sub-contractors, it is likely that they, on the politicians' principle that a poor man is justified in appropriating what he wants, wherever he sees it, have quite as much right to the help of the lien law as the principal contractors. But the court says that they "are bound to know, by necessity, all the terms of the contract made by their principal in any event, and they, therefore, know of the prohibition," and there is consequently "no hardship" in "enforcing a provision prohibiting liens against them." In point of fact, sub-contractors, probably, rarely know the terms of the contract into which their principal has entered, but the building community will not suffer much from a slight restriction of the legalized plundering which persons inexperienced in business dread so much, and which undoubtedly checks the improvement of real estate.—*Amer. Architect.*

See that the water cistern is cleaned out regularly, say every month or two.





First Floor

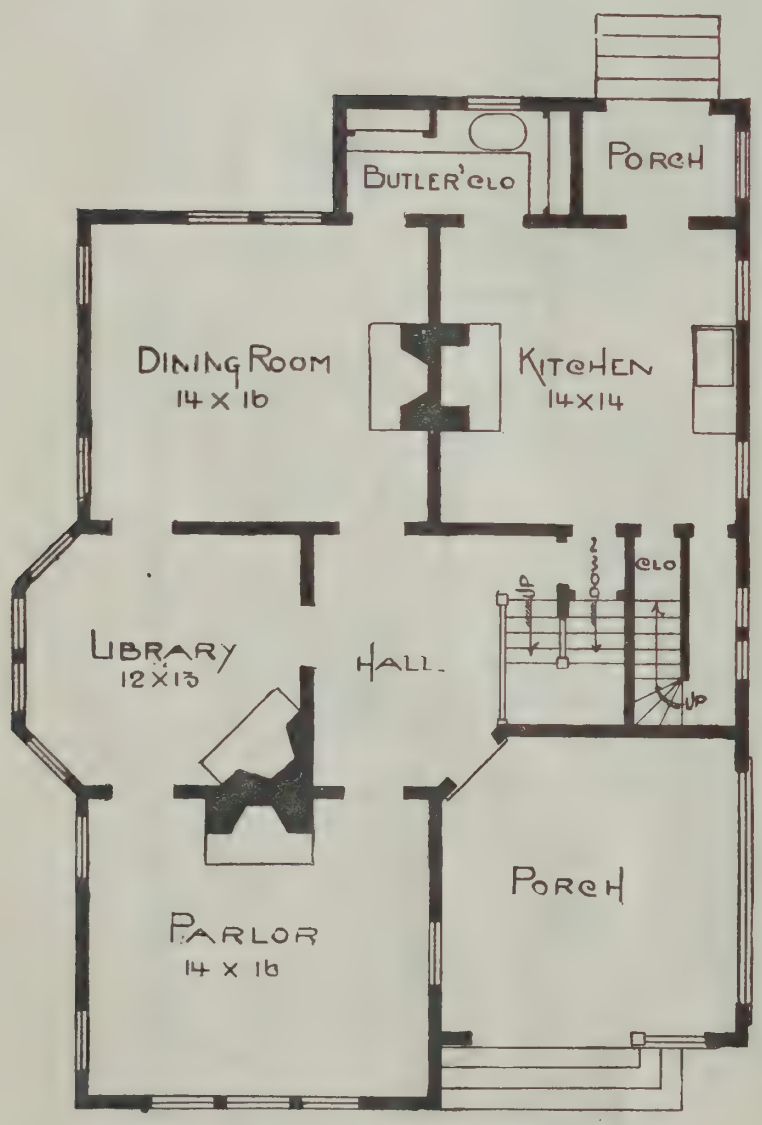


Second Floor

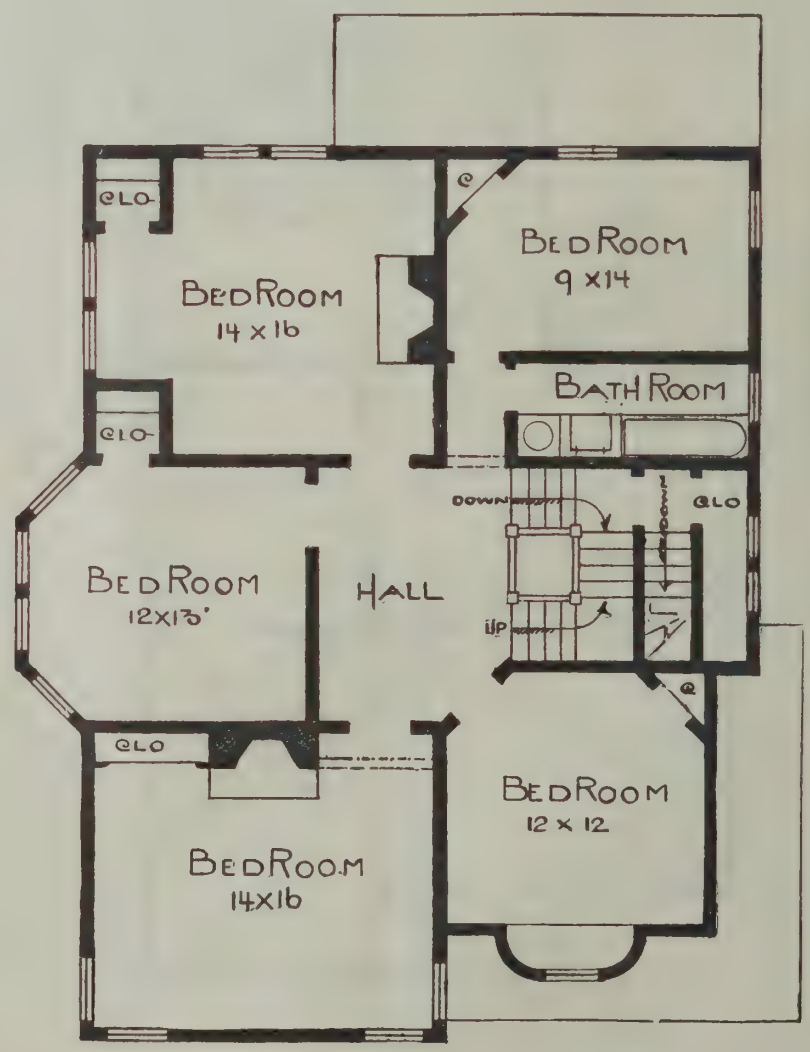
PUBLIC LIBRARY

A COTTAGE AT SPRINGFIELD, MASS.—[See page 46.]





First Floor

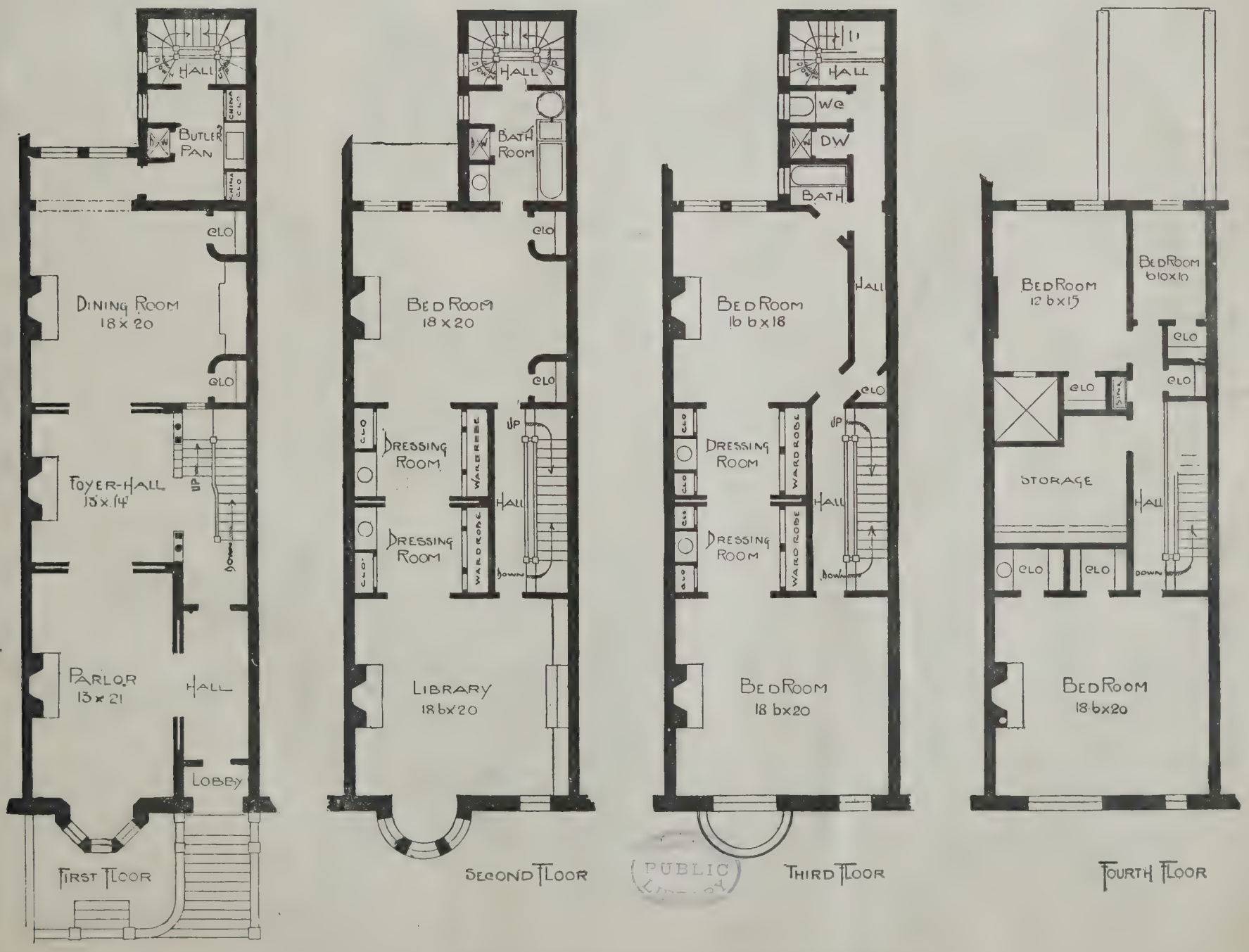


Second Floor

PUBLIC LIBRARY

A COTTAGE IN NEW JERSEY.—[See page 46.]





CITY RESIDENCE, NEW YORK.—[See page 46]

ST. JOHN'S CHURCH, SAN FRANCISCO.

San Francisco is to have a striking piece of church architecture in the new edifice which will soon take the place of the present house of worship of St. John's Episcopal parish. The new church will occupy a corner lot at Fifteenth and Valencia streets, 100 by 147 feet There will be placed upon the site three connected buildings, a church to seat 750 persons, a guild hall and Sunday school building, and a rectory. These will be connected by an open cloister round three sides of a court.

The church will be of the Byzantine style, and great freedom in designing has been taken by the architect. In several of its salient features it resembles Trinity Church, Boston, Mass., the late Mr. Richardson's celebrated work. It will cover a space 83 by 100 feet on the corner of the lot. The principal entrance will be through three massive arches in the north transept gable facing Fifteenth street. The chancel will be placed at the east end facing Julian avenue, and to the north of it will be a small side chapel which will accommodate about 75 worshipers. On the south side of the chancel will be located the organ chamber. A crypt under the chancel, chapel, and organ chamber will give accommodations for choir, clergy, vestries, and rooms for treasurer and sacristan. Connection will be made with the main auditorium by a sloping ambulatory extending around behind the altar of the side chapel. Each of the angle turrets, or towers, flanking the chancel and north transept, will contain spiral staircases. The triforium is intended to be used principally on festival and other occasions when the church is overcrowded.

At the crossing of the nave and transepts and under the central tower is to be a dome 34 feet in diameter. The materials to be used are pressed brick and terra cotta trimmings. The roof will be covered with green slate and the dome over the chancel with burnished copper. It is estimated that the expense of the buildings will be about $57,000.—*N. Y. Sun.*

A RESIDENCE NEAR NEW YORK.

Our engraving, page 40, illustrates a residence erected for Mr. Fellows Morgan at Short Hills, N. J. It was made direct from a photograph of the building taken especially for the Scientific American.

Dimensions: Front, 50 ft. 6 in.; side, 40 ft. Height of first story, 10 ft.; second, 9 ft. First story built of field stone, laid at random, and pointed in red mortar. Second story shingled, painted red, with bottle green trimmings. Roof shingled, painted Indian red. Hall trimmed with oak, is furnished with ceiling beams, paneled wainscoting, and a broad staircase leading to second floor. Windows on landing are glazed with stained glass. Den is located under staircase. Parlor and library are trimmed with cherry, and each is provided with open fireplaces, furnished with tiled hearths and hardwood mantels. Dining room, trimmed with oak, contains a brick fireplace. Kitchen, butler's pantry, and rear hall are trimmed and wainscoted with Georgia pine. These apartments are fitted up complete. There are four bed rooms, with large closets, and bath room on second floor. Bath room wainscoted, contains tub, bowl, and closet complete. Floors of hardwood, laid in narrow widths. Three rooms in attic. Cemented cellar contains furnace. Cost, $9,000, complete. Mr. Wilbur S. Knowles, New York, architect.

A COTTAGE AT SPRINGFIELD, MASS.

Mr. Horace Smith has erected on Crescent Hill, Springfield, Mass., the cottage illustrated in the engraving given on page 43. Our engraving is from a photograph. It is an admirable design, both in arrangement and appearance. The cozy little piazza and balcony, the attractive hall and staircase, the pleasant nooks and fireplaces, all are fine features.

Size: Front, 30 ft.; side, 56 ft.; cellar, 7 ft.; first story, 9 ft. 6 in.; second story, 9 ft. There is a cellar under whole of the house, which is cemented and provided with a laundry, with wash trays cased and supplied with hot and cold water, also a furnace is in cellar. This cellar is inclosed with a foundation wall of stone, built up to grade, while the underpinning is of local bricks. The exterior of first story is covered with beveled white pine clapboarding, painted gray with brown trimmings, while the second story is covered with white pine sawed shingles with body painted a lighter shade. The roof is shingled. The porch being low, it affords a shady and cool retreat. The upper sashes to windows are glazed with small panels, and the windows on landings to staircase are glazed with artistic stained glass. On the first floor the rooms and the hall connect, and can be thrown together by double folding doors. The door and window casings are neatly beaded with turned sunk angle blocks at corners. The trim to the principal rooms on first floor are of hardwoods, while all the rest of the trim throughout is of whitewood, some of which are finished in stains, while the rest is in the natural. The hall contains an ornamental staircase. Under the upper part of staircase a nook is formed with a seat and window, also a closet that is fitted up with wardrobe hooks and shelves. The parlor and dining room have pleasant open fireplaces, with neatly laid tiled hearths and pretty hardwood mantels, the latter having a pleasant alcove, with arch, etc., also a closet. A very large butler's pantry, between dining room and kitchen, separates the later entirely from the rest of the house. This pantry and store pantry are neatly fitted up with dressers, drawers, shelves, and cupboards. The kitchen is wainscoted with narrow beaded stuff, and contains a sink that is neatly cased up, and also a slate hearth and a lobby, with stairs leading to cellar. Five large and well lighted bed rooms on second floor are amply provided with closets that are neatly fitted up with shelves, etc. There is also a bath room that is wainscoted and provided with a bath tub, wash bowl, and water closet, and is furnished with the usual fittings. Two rooms finished off in attic, besides plenty of storage room. This house cost $3,200 to build.

A COTTAGE IN NEW JERSEY.

Our engraving, page 44, illustrates a cottage erected at Short Hills, New Jersey. It was made direct from a photograph of the building taken specially for the Scientific American.

Dimensions: Front, 34 ft. 6 in; side, 47 ft. 6 in. Height of ceilings: cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in. Underpinning of rock faced sandstone. Exterior throughout is covered with cedar shingles, stained dark green. Roof shingled, painted red. The



ST. JOHN'S CHURCH, SAN FRANCISCO.

trim throughout is of whitewood. Parlor and library stained and finished in cherry, hall and dining room in oak. All other woodwork finished natural. Hall contains an ornamental staircase, turned out of ash. Fireplaces built of brick, have tiled hearths and hardwood mantels. Floors of hardwood, laid in narrow widths. Kitchen and pantries are wainscoted and fitted up complete. There are five bed rooms and bath room on second floor; the latter is wainscoted and fitted up with the usual furnishings, etc. Two rooms in attic. Cemented cellar contains laundry and furnace. Cost, about $7,000. The late Mr. Frederick White, of New York, was the architect.

CITY RESIDENCES, NEW YORK.

Our engraving, page 45, illustrates some very handsome houses erected for Mr. J. S. Silver, on West Eighty-sixth Street, New York City, N. Y. Dimensions: Front 22 ft.; side 75 ft. 6 in., not including front porch. Height of ceilings: Cellar 7 ft.; basement 9 ft.; first story 11 ft.; second story 10 ft.; third 9 ft. 6 in.; fourth 9 ft. The elevations are excellent. The fronts are built of stone relieved with carved panels. Roof is covered with red English tiling. The interior is finished in an elegant manner, and contains all modern conveniences, such as electric bells, speaking tubes, dumb waiter from basement to third floor, etc Cellar cemented, contains two furnaces and other apartments. Basement, trimmed with ash, contains billiard room, with open fireplace, parquet floor, etc., kitchen, laundry, pantries, and servants' bath room, all complete. Kitchen is wainscoted with Italian marble. Hall and foyer hall, trimmed with ancient oak, have parquet floors. Entrance hall contains a hat tree built in with seat, mirror, etc. Foyer hall contains staircase, with carved newels, etc., an open fireplace of stone, and a paneled wainscoting three feet high, with beveled plate mirrors from wainscot to ceiling. Parlor, trimmed with mahogany, is furnished with an open fireplace, with hearth of tiles, facings of Mexican onyx and mantel elegantly carved. Dining room is finished in "Old English" style and trimmed with ancient oak; it is furnished with a parquet floor, ceiling beams, paneled wainscoting, a massive buffet built in, handsomely carved, and an open fireplace with a tiled hearth, Mexican onyx facing, and a carved mantel. Butler's pantry contains butler's bowl, dresser, china closets, etc. Second floor, trimmed with mahogany, contains library, dressing rooms, one bed room, and bath room. Library and dressing rooms have parquet floors. The former contains bookcase and secretary built in, with bits of carving, etc. Dressing rooms contain wash bowl, drawers and wardrobe. The back and side of wash bowl and all doors are glazed with beveled plate mirrors. Bath rooms are paved and wainscoted with Italian marble, and furnished with enameled tubs, sitz bath, bowl, closet and spray. Fireplaces have tiled hearths and facings and carved mantels. Halls, third and fourth floors, are trimmed with white oak. Cost about $36,000. Mr. J. Prague, of New York, architect. Our engraving was made direct from a photograph of the buildings taken especially for the Scientific American.

A VILLAGE CHURCH.

Our engraving, page 48, which was made direct from a photograph of the building taken especially for the Scientific American, illustrates an Episcopal church erected at Short Hills, New Jersey. It is built of field stone laid at random, and pointed in red mortar. The auditorium is 26 ft. × 50 ft., has a seating capacity of 215. The altar is 19 ft. × 23 ft. Study, conveniently placed, has an outside entrance thereto. Ceiling beams, rafters, and bracings are dressed, cut, and chamfered, and finished natural. Other woodwork of oak. Hardwood floor. Heated by furnace. Lamb & Rich, of New York, architects.

A DWELLING AT HOLYOKE, MASS.

We illustrate on page 49 a country house erected for C. H. Heywood, Esq., on Northampton Street, Holyoke, Mass., at a cost of $12,000, complete. The engraving was made direct from a photograph of the building taken specially for the Scientific American. There is a cellar under whole of house, with a cemented bottom. Cellar contains laundry, with wash trays, etc., complete. The foundation is of stone, the underpinning of local brick. The first story is covered with beveled white pine clapboarding, and is painted as follows: Body dark red; trimmings dark olive green; blinds yellow; while the second story is covered with cut shingles, and is painted yellow, with red blinds. The roof is covered with shingles also, and is painted red. The plans show plenty of large rooms conveniently arranged. All are fitted up in a very handsome manner. The principal rooms are separated by double sliding doors, and all are provided with pleasant open fireplaces, fitted up with hearths and facings of tiles in artistic designs, mantels of hardwood handsomely carved to correspond with the trim of each room. The parlor and sitting room are finished in cherry, the halls, library, and dining room are finished in quartered oak. The hall has a vestibule, a pleasant nook with seats, a spindle arch that separates the staircase hall from hall proper. This staircase is an ornamental one in oak. The second floor contains eight well lighted bed rooms amply provided with closets. Three rooms finished off in attic, besides plenty of storage room. This house is steam heated, and provided with gas, speaking tubes, electric bells, and all the modern improvements.

Good Cement for Sticking Porcelain on Glass.—Starch sixty parts, finely pulverized chalk one hundred parts. Mix with equal parts of water and alcohol, with the addition of thirty parts Venice turpentine, taking care to agitate the mass with a stick so as to insure its homogeneity.—*The Pottery Gazette.*

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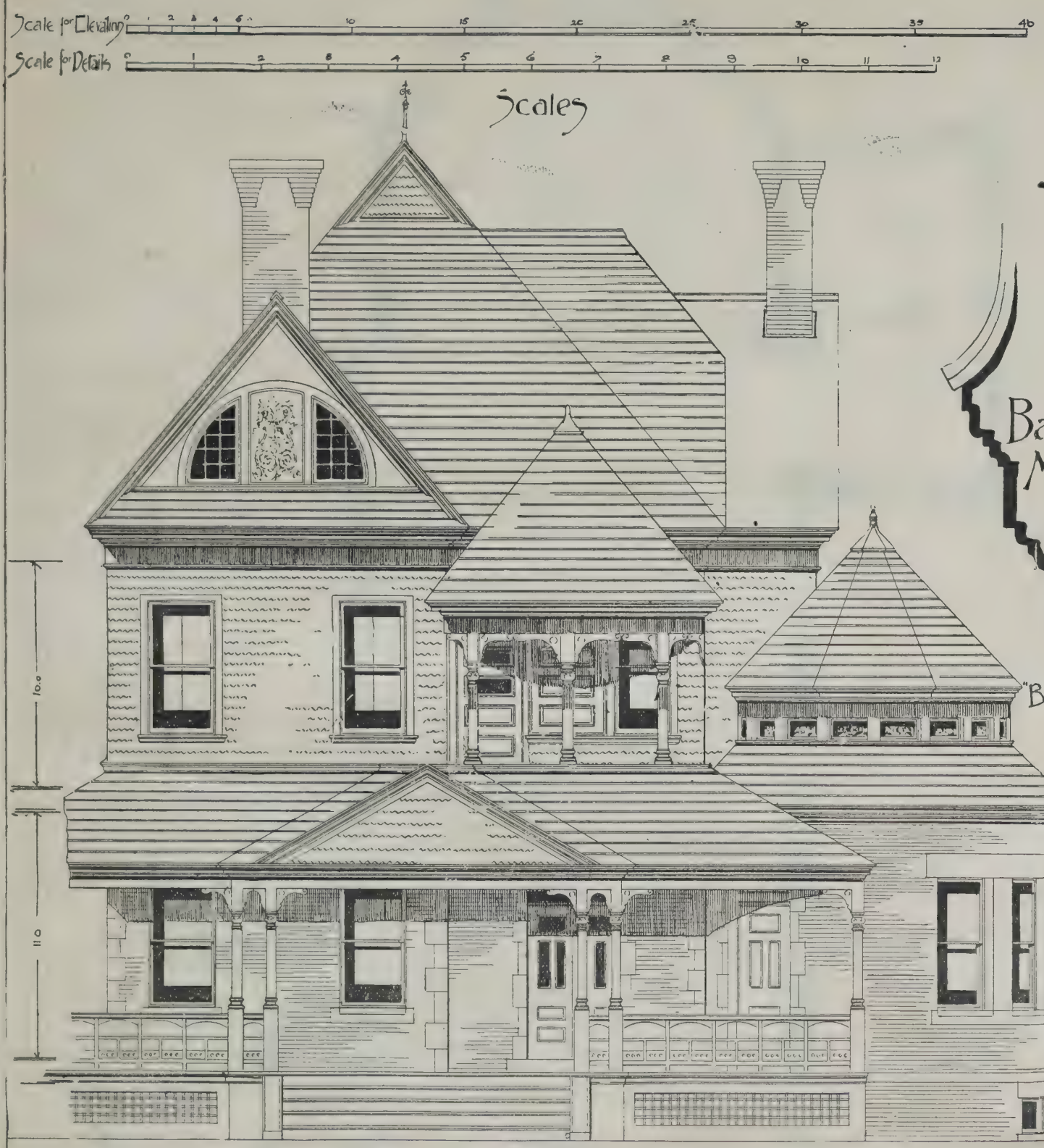
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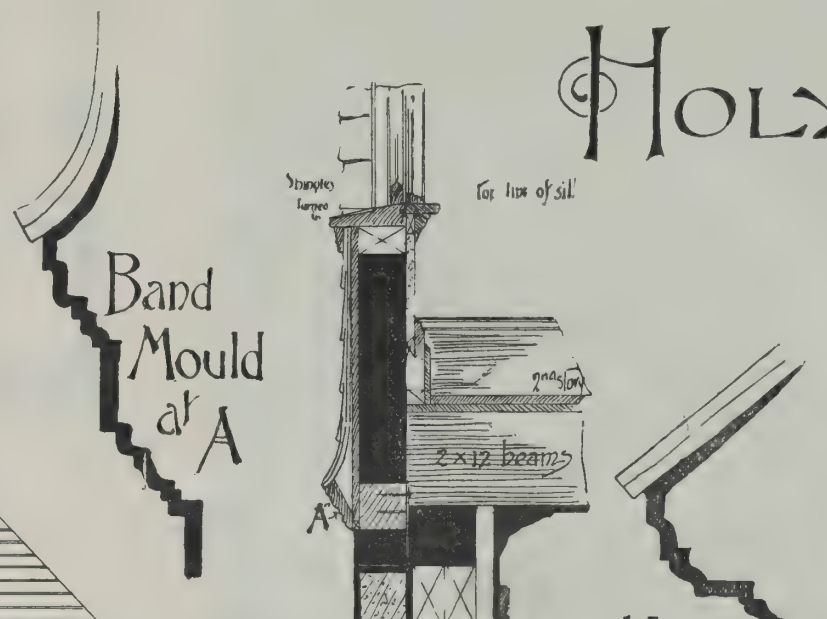
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A RESIDENCE SITUATED AT HOLYOKE, MASS.

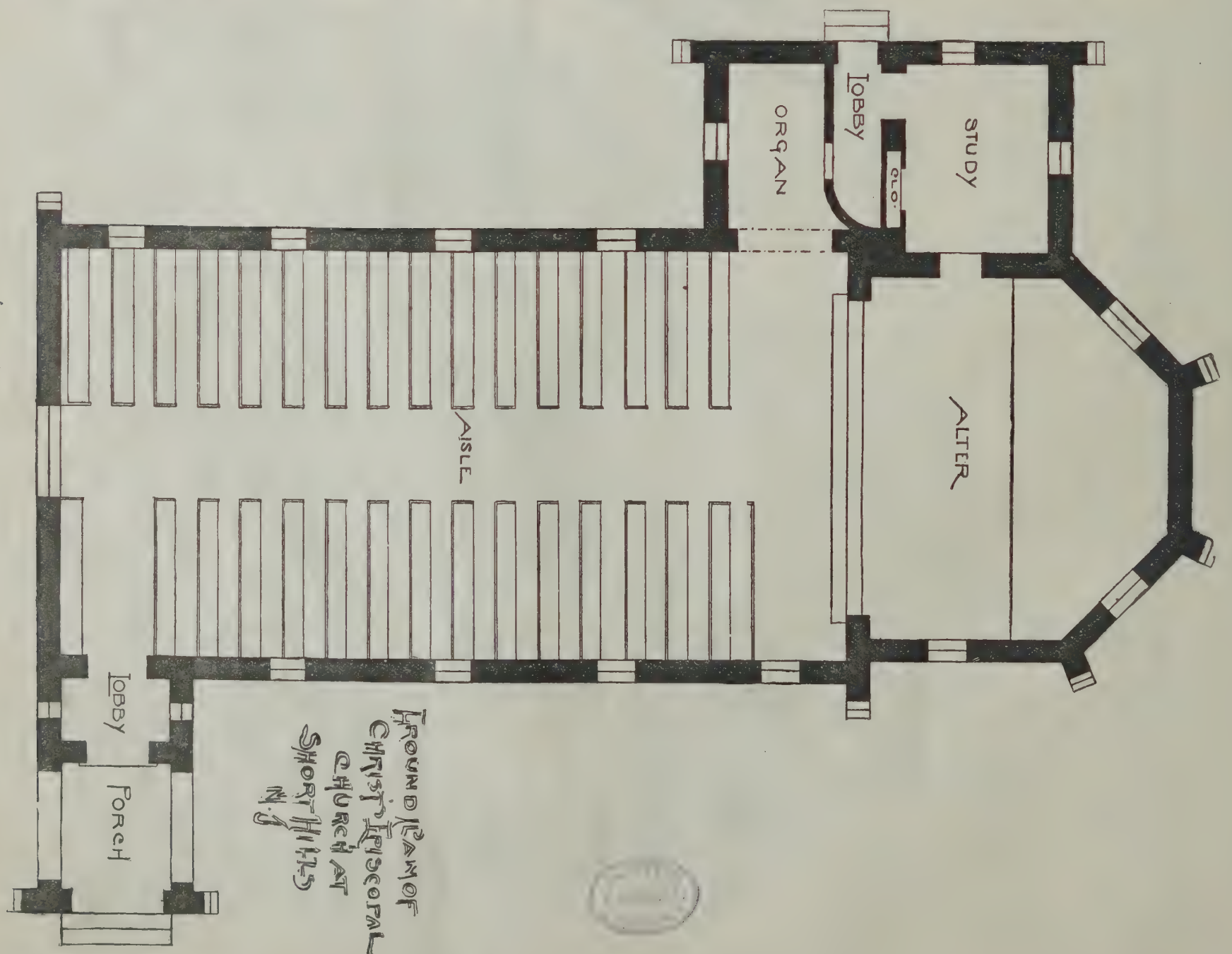
[See page 38.]



Front Elevation

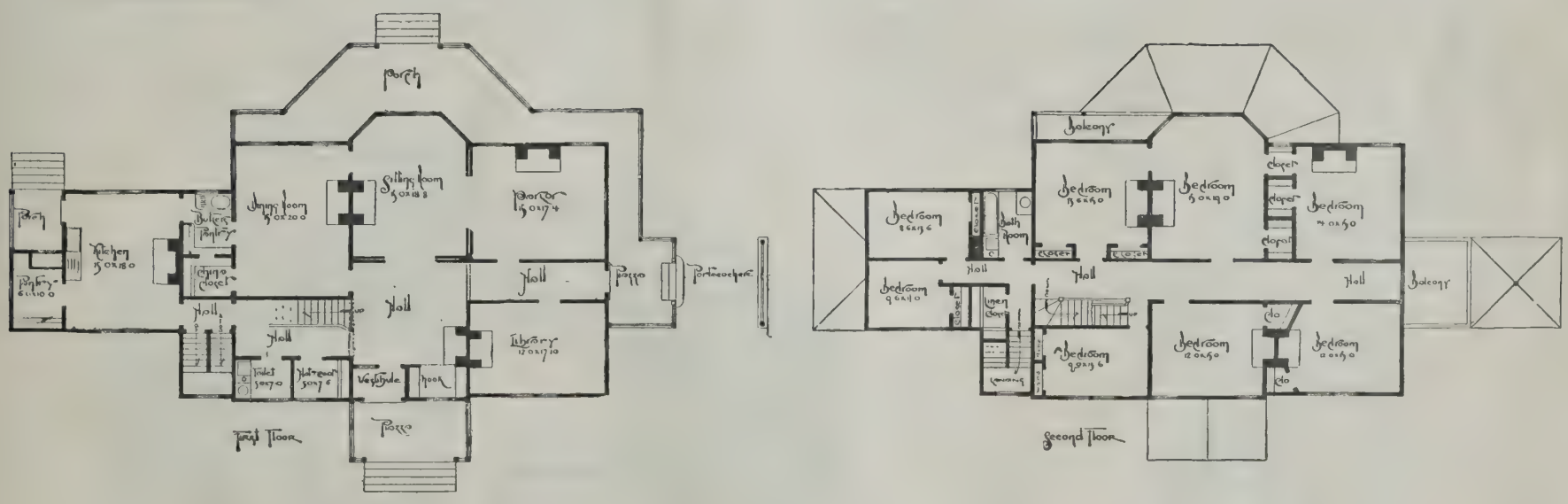




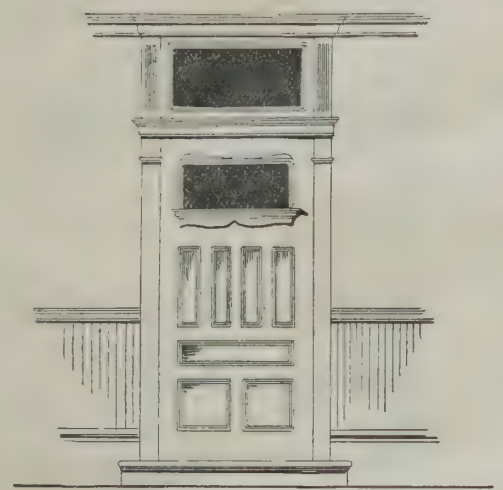


A VILLAGE CHURCH.—[See page 46]





A DWELLING AT HOLYOKE.—[See page 46.]



FRONT ENTRANCE DOOR.



"Eaves" Gutter above

A DWELLING OF MODERATE COST.

[See page 88.]



Band Mould



Elevation

Detail of Staircase



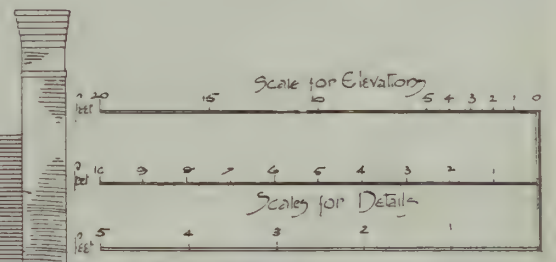
Detail of FRONT PORCH.



Front Elevation.



Section of Heights

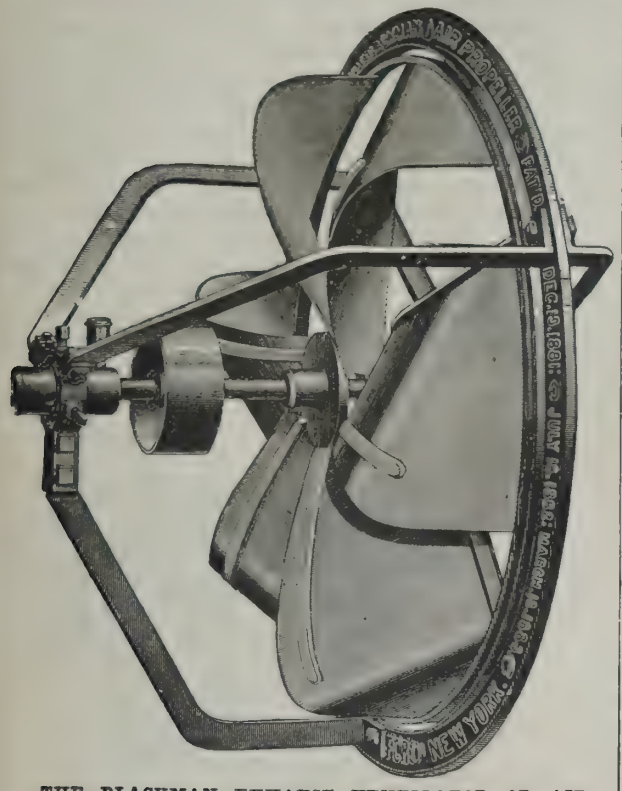


Side Elevation.

LIBRARY

AN IMPROVED VENTILATOR.

Some eight years ago the Blackman air propeller was patented and introduced with the design of applying systematic and thorough ventilation under varying conditions to buildings of all kinds. Its success is best attested by the sales of several thousand during that period, and the use and approval of such by the best known architects of the country. Through its means, and with proper application by experts, ventilation has become a science. Perhaps the most severe test of its efficiency is its extensive use in the press rooms and stereotyping departments, situated in the basements, of such journals as the New York *Herald, World, Sun, Times, Mail and Express, News*, and other metropolitan dailies, and in large metal smelting establishments, from whence the heat is removed immediately upon its radiation from furnace or crucibles. Outside of the distinctively manufacturing industries, it has been applied to hospital dormitories, car stables, banks, offices, hotels, theaters—in short, wherever ventilation is required. The newer public schools of Brooklyn, Boston, Buffalo, Syracuse, and of many of the interior cities in this and other States, are ventilated by its means, while a system, with it as the governing power, is used in the ventilation of the huge engine and dynamo rooms of the Equitable building, the Union Trust Co., in the Gallatin Bank building, the Central Trust Co., the Mercantile Bank, the Garfield National Bank, the Presbyterian Hospital, the Brooklyn Court House, and in many other prominent buildings beyond space for record here. In avoidance of all technicalities, its merits may be summarized in the statement that it is positive in its grasp and propulsion of air, noiseless in operation, light in its requirement of power, and free from apparent draught.



THE BLACKMAN EXHAUST VENTILATOR OR AIR PROPELLER.

The Blackman air propeller is manufactured by Howard & Morse, 45 Fulton Street, New York City, who issue a handsomely illustrated catalogue of the appliance, which is replete with many interesting tables bearing on its operation, and which can be obtained upon application.

IMPROVED BATH TUBS AND BATHING APPLIANCES.

The illustration represents a standard porcelain-lined bath tub, made by the Standard Manufacturing Co., of Pittsburg, Pa. The company furnish these tubs with any desired style of trimmings, with combination cocks or brass valves and handles, low down or top supply, hot and cold index plates, etc. The tub is essentially a china dish, cased in iron, and can be filled at any hour of the day or night without the slightest noise, while there is no vapor from the hot and cold water supply at the bottom. Opposite the supply the overflow leads to a stand pipe, and when the water reaches the overflow partition the overflow takes place, and all excess flows off to soil pipe without retarding pipes to produce back pressure of sewer pipes. Neither of the traps can be siphoned out, with back vent closed or open. The connections of these baths are easy to attach and convenient to remove, and all builders or owners of private residences putting in bathing appliances would do well to send to the company for their latest illustrated catalogue. The company also make a variety of styles of standard porcelain-lined sitz baths, and a foot or child's bath.



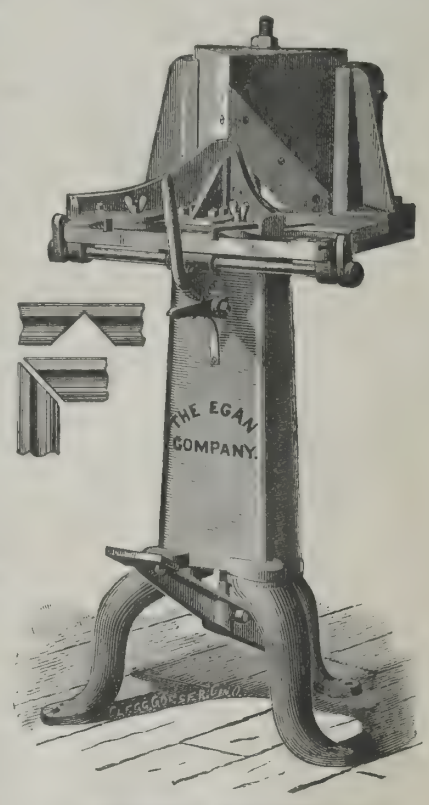
A PORCELAIN LINED BATH TUB

RICHMOND HEATERS FOR STEAM AND HOT WATER.

The accompanying illustrations show a new heater made by the Richmond Stove Co., Norwich, Conn., called the "Richmond," and adapted for either steam or hot water heating. The sectional view of the boiler clearly presents the patented features of construction, showing the effective fire surfaces and the careful provision for circulation within the boiler. The ash pit is of ample proportion, and the well known Richmond Duplex Grate is used, which has been a special feature in other heaters made by this company, and has given them a well earned reputation. The Richmond has been made to meet the rapidly growing demand for boilers of small sizes, with fire pots of 12, 15, and 18 inch diameter, and will be found especially adapted for use in small houses, offices, bath rooms, conservatories, etc. The Richmond Stove Co. will be pleased to forward an illustrated catalogue on application. Their heaters have always given good satisfaction, and this last addition to the large line they are manufacturing is worthy of attention.

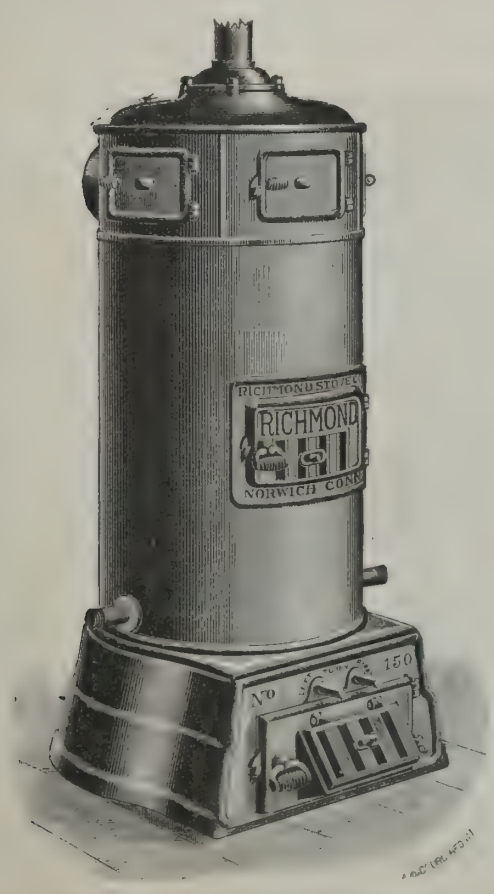
A MITERING AND JOINTING MACHINE.

The accompanying illustration represents a foot power mitering and jointing machine lately brought out by the Egan Company, of Cincinnati. It is very simple to operate, and is designed to be a very reliable and a very accurate machine, and one which can be used to great advantage in sash, door, and blind, picture frame, and furniture factories. Working by foot power, it gives the operator the use of both hands to adjust and set the work. The frame is very strong and rests on three legs. The treadle is connected to the frame in such a manner as to allow the heaviest moulding to be cut with ease. The table is planed perfectly true, and suitable adjustable fences are attached for cutting double or single. The knife is true, with the throat plate working close up, and will joint one or two pieces at one operation. It will cut a true angle or miter, and, having a shear cut, prevents the breaking down of the stock. This machine will cut through a moulding 5 in. wide and 5 in. high. For further information in regard to this machine, address the Egan Company, Nos. 209 to 229 W. Front Street, Cincinnati, Ohio, U. S. A.

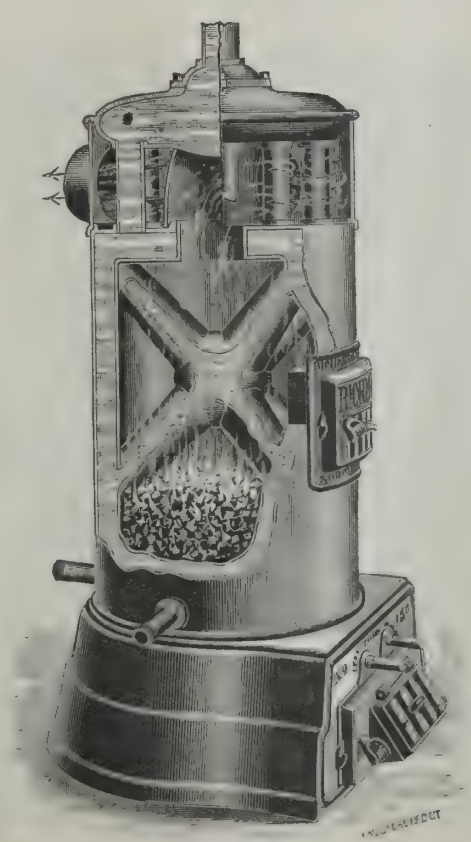


AN IMPROVED MITERING AND JOINTING MACHINE.

To kill blue grass growing between bricks around the lawn, wash the bricks with salt water or strong solution of soda.



RICHMOND HOT WATER HEATER.



RICHMOND HEATER—SECTIONAL VIEW.



RICHMOND STEAM HEATER.

POWERS' REGULATOR FOR STEAM AND HOT WATER HEATERS, ETC.

In the devices herewith represented no electricity is used, and they are designed to be entirely automatic, and adjust themselves to all kinds of weather. In Fig. 1 the regulator is shown without a thermostat, as a

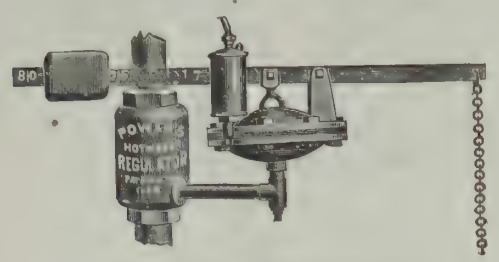


Fig. 1.—POWERS' REGULATOR.

limiting device for the heater only. This regulator closes the damper of a hot water heater just before the boiling point is reached, and also, by means of the thermostat, the damper is closed when the house has reached the temperature to which it has been adjusted. This twofold action depends in both cases upon the direct pressure of steam or vapor. The casting, B, Fig. 2, is a shell, tapped at either end to receive a two

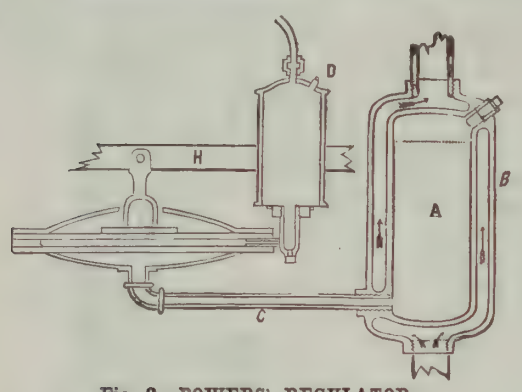
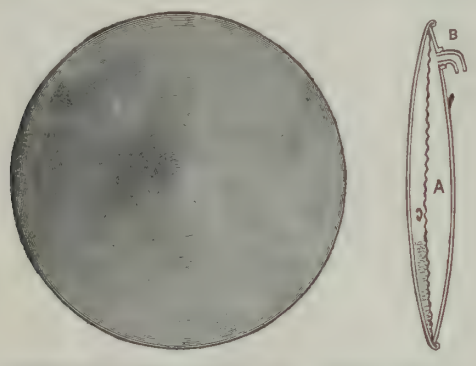


Fig. 2.—POWERS' REGULATOR.

inch pipe, and containing within a second shell, A, called the supplementary boiler or steam generator. This is placed in one of the flow pipes immediately above the boiler, and the water circulating through it between the two shells heats the inner one. The inner shell of the generator contains water, entirely separate from that in the heater. A tube, C, leads from the generator to and supports the diaphragm casting,



POWERS' REGULATOR—THE THERMOSTAT.

with the usual piston and lever, which is connected with the damper and check draft, the same as in a steam heater. The generator, A, is filled with water through the plug at the upper right hand corner, as shown in the cut. It is hermetically sealed, so there is no escape for the water contained therein. This water being under atmospheric pressure only, boils at 212 degrees. The water of the heating system is under added pressure, due to the height of the column of water up to the expansion tank. As soon as the temperature of the circulating water rises above 212 degrees, steam begins to form in the supplementary boiler, and pressing the water out through the tube, C, raises the diaphragm and lever, and closes the damper. The fire is at once checked, and no steam can form in the boiler, as its boiling point has not been reached. When the temperature falls below 212 degrees, the steam condenses and the damper opens.

The illustration shows a front and sectional view of the thermostat, which is made of heavy sheet brass, polished and bronzed, and has inside a corrugated metallic diaphragm which divides it into two separate compartments. In one compartment hermetically sealed is placed a volatile liquid which vaporizes at about 60 degrees, forming steam in the same way that water does at 212 degrees. When cold, this fluid condenses and forms a partial vacuum in the chamber, and the diaphragm is forced over closely against the front or smooth wall of the thermostat by the pressure of the air on the other side. The thermostat is hung upon the wall of a central room in the same manner as a picture. Connected with the space upon the back side of the diaphragm is a small lead pipe (one eighth inch bore) which leads down inside the partition, and connects with the diaphragm at the heater, where the point at which the damper will open is determined by the position of the weight upon the lever, and a uniform heat is maintained as long as the fire is kept up. This thermostat is equally adapted to the control of a low pressure steam apparatus and a furnace.

For further information relative to this regulator system, address W. P. Powers, 83 Erie Street, Chicago, Illinois.

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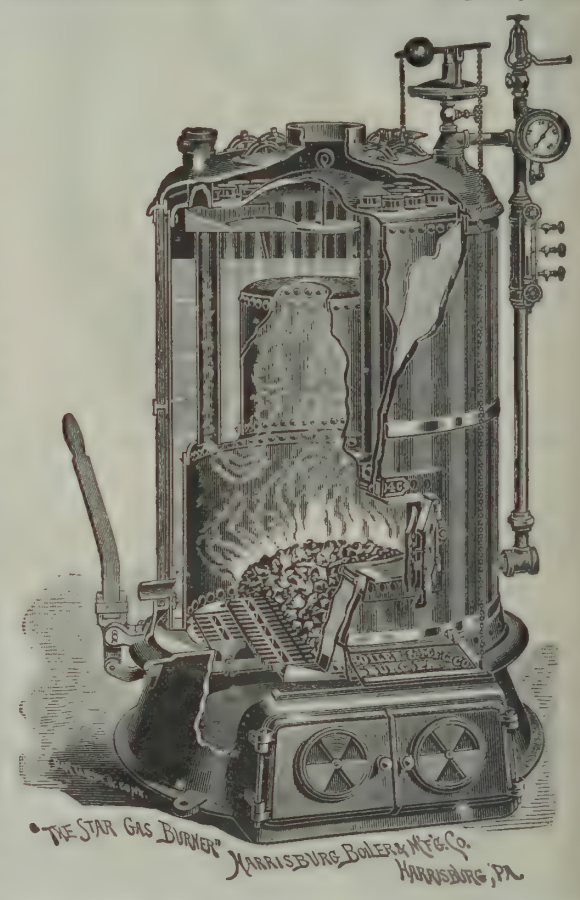
Two brands of drawing paper have recently been placed on the market that are particularly designed for working drawings. They are superior to the manila generally used, and are reasonable in price. Have a slight buff tint, which is more agreeable to the eyes than the ordinary colors. Are uniform in finish, and of a leather toughness, unsurpassed in erasing qualities. These brands are known as "Bon Accord" and "Doppelt." Are furnished in 10 yard rolls, from 36 to 54 inches wide. G. S. Woolman, 116 Fulton St., New York, will send samples by mail to any interested, and will furnish prices on application.

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The Allegheny Geometrical Wood Carving Co., whose office is at No. 708 Penn Avenue, Pittsburg, Pa., are now selling a wide variety of their finished productions to builders and architects, and we present, in the accompanying illustrations, two views of such work as they make for wainscoting, ceiling, casing, moulding, and base. Their goods are especially designed for the interior finish of public and private buildings, railroad cars, boats, and wherever handsome effects in wood are desired. They are made by a machine invented by Dr. C. L. Goehring, of Allegheny, Pa., which has only recently been brought to a state of perfection, and by its use a richness of ornamentation and completeness of detail can be carried out which could not possibly be obtained in any other way, and at the same time the cost is only moderate. The company use only the best seasoned wood, owning themselves one of the most efficient drying kilns in the country, and their wood is of every variety, including, for standard patterns, walnut, cherry, oak, ash, poplar, white and yellow pine, the hardwoods being especially recommended for superior finish in oil. The company have artistic designers constantly at work getting out new styles; and architects and builders having in hand work which will bear rich and beautiful interior finish will do well to write to the company for samples of their work.

STEAM AND HOT WATER HEATING AND FOR POWER.

The illustration represents a gas burner, steam or hot water heater, manufactured by the Harrisburg Boiler and Manufacturing Co., sole owners of all the Lindemuth patent boilers. It is called the "Star," and the manufacturers claim that a saving is effected by its use of seventy per cent. of the gases commonly wasted by other boilers, as the smoke and gas in the gas chamber over the fire are held there until all the combustible matter is consumed, being then driven by new rising gases down along the inner side of the gas chamber, to be carried off by the flues. There are caps at the top of the flues to check and prevent too rapid passage of the heated air, making it do more service before entering the air chamber, and passing off into the smoke flue, not in thick volumes of gas or smoke, but mainly incombustible matter, the advantage of this construction over other furnaces being very nota-



ble in the combustion of bituminous coal. The steam is taken from the boiler by a dry plate extending therein to a point where it is hottest and driest, and the furnace has a comparatively small amount of flue surface, with a very large proportionate fire box surface. The grate is a shaking one, operated by a lever, and is extra strong, with ample air space beneath it, so that it will not easily burn out, while it can be readily replaced when necessary. There are hand holes in the top of the dome, by means of which the flues can be readily cleaned.

The appearance of this heater is everything that can be desired. It is covered with wood, after the manner of covering engine cylinders, and between the wood and the boiler proper is a layer of asbestos millboard, which is non-combustible, and prevents all danger from fire. An air space between the wood and asbestos still further adds to the non-conducting surroundings of the boiler, preventing radiation and waste of heat in the cellar.

The office and works of the company are at Nineteenth and Derby Streets, Harrisburg, Pa.

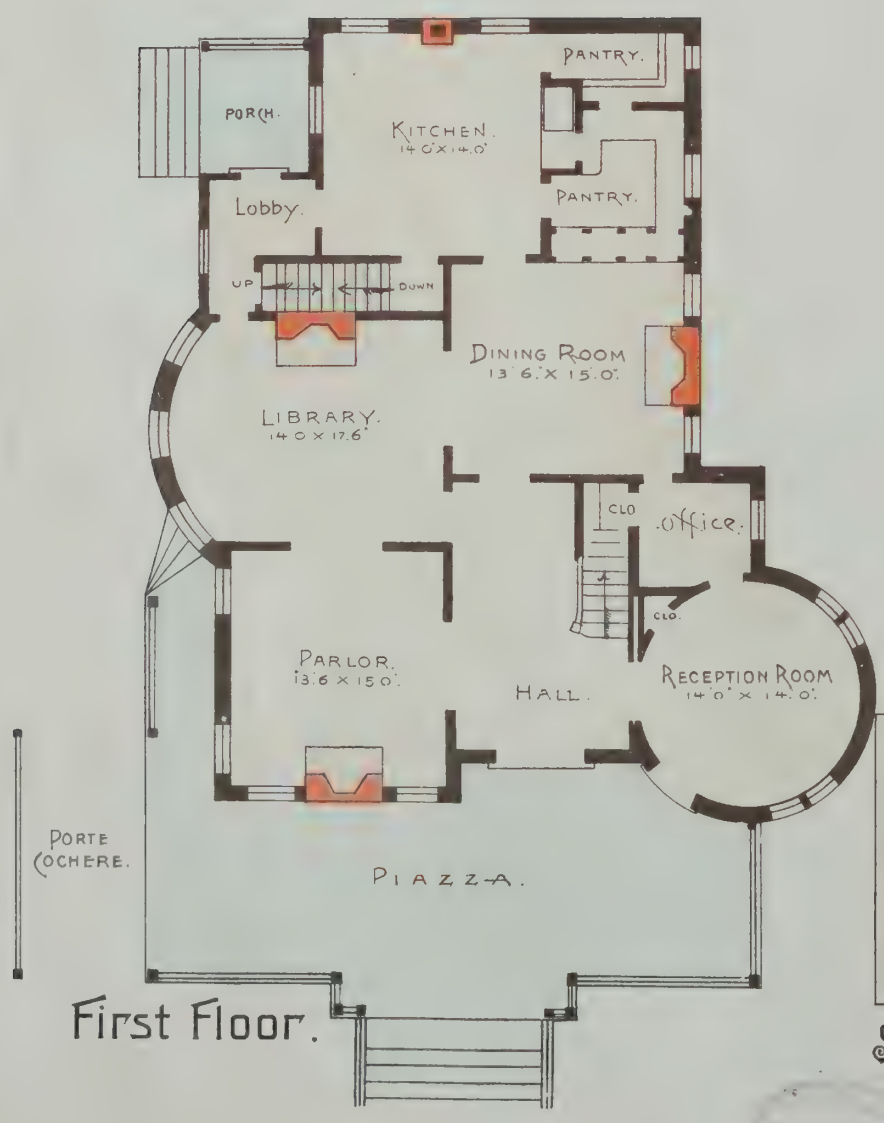


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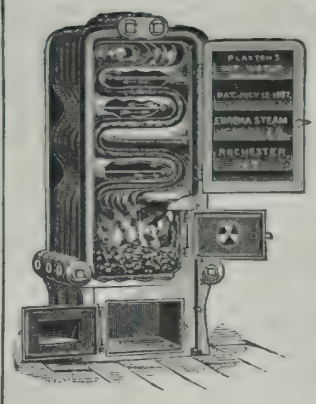
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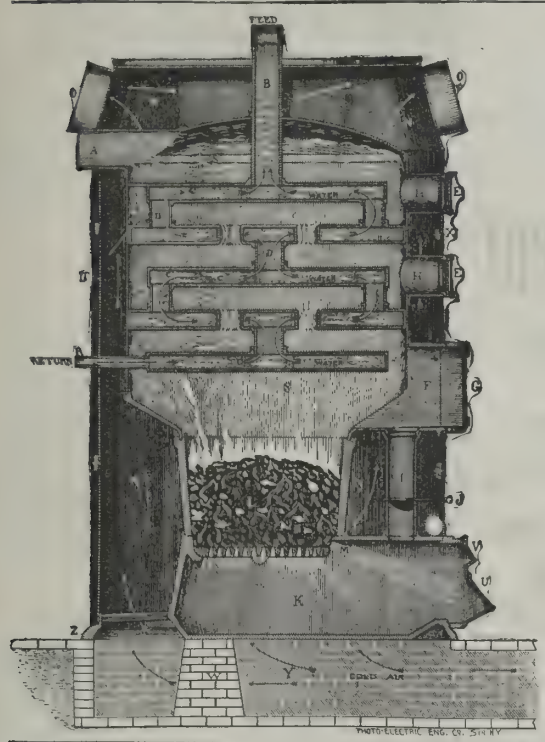
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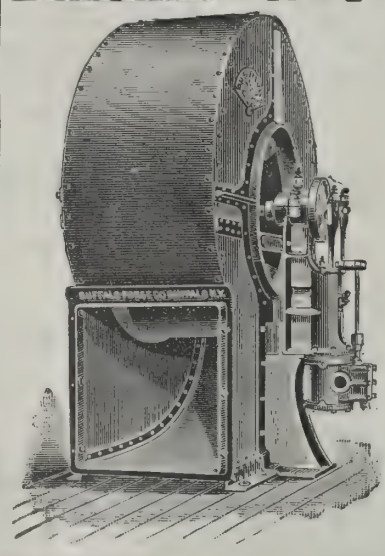
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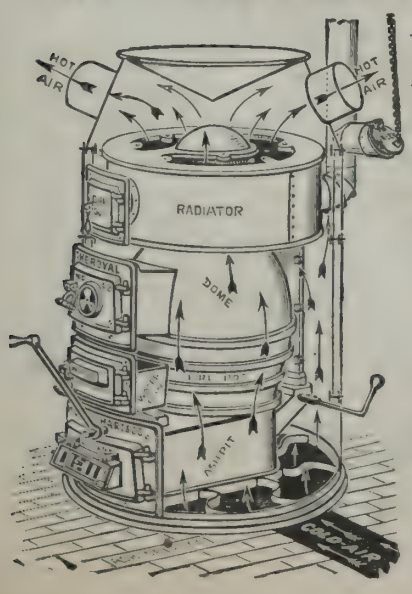
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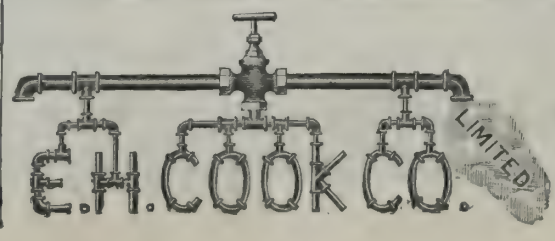
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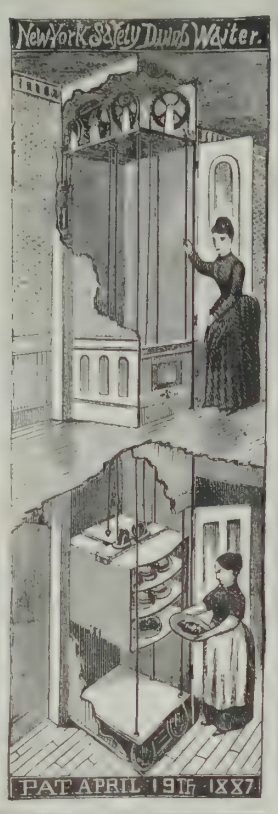
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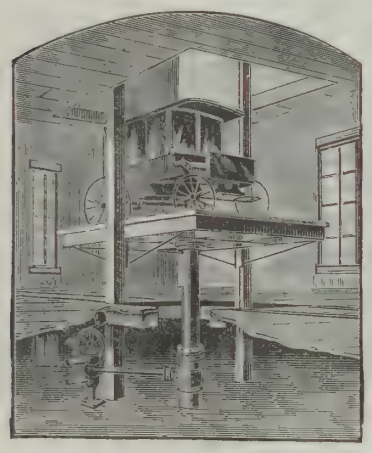
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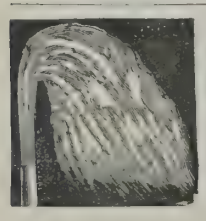
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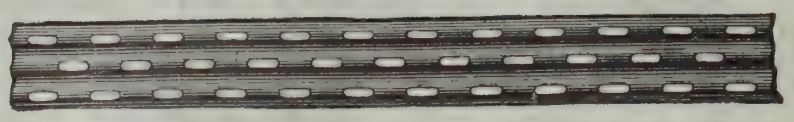
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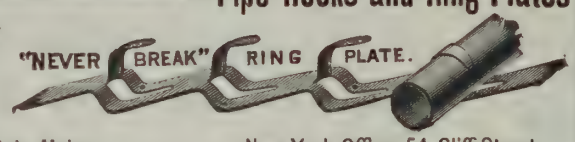
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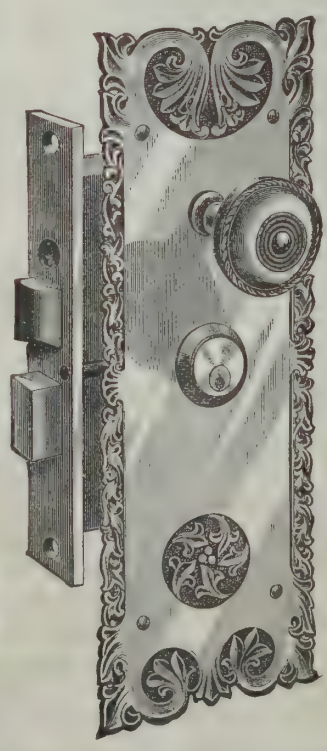
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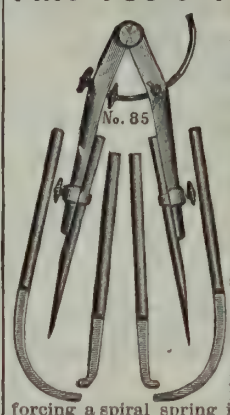
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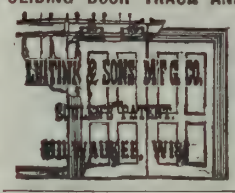
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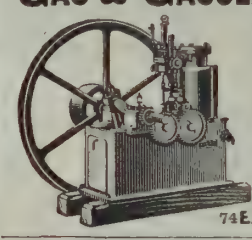
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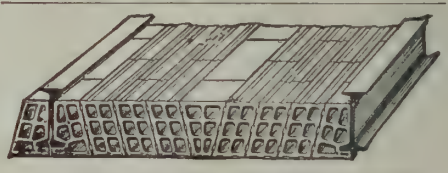
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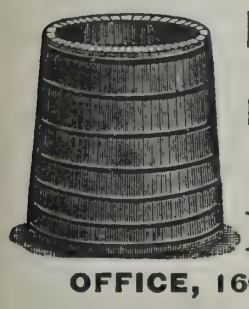
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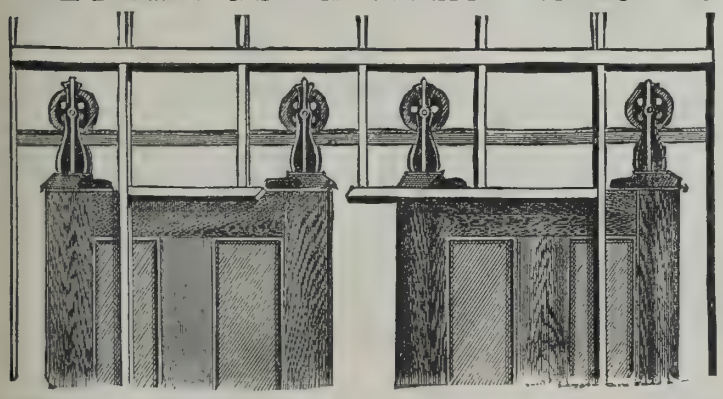
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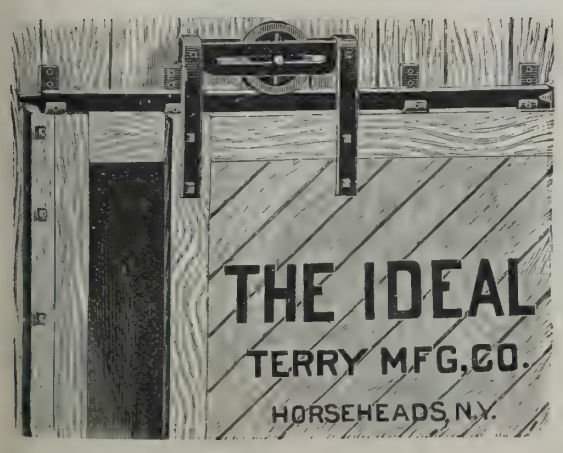
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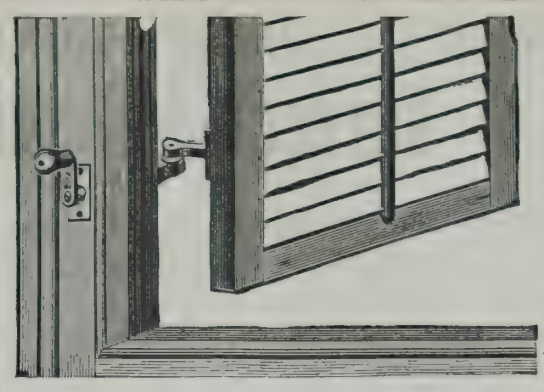
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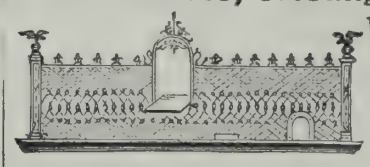
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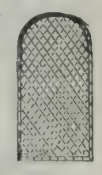




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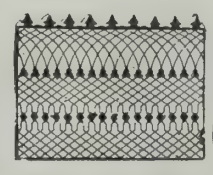
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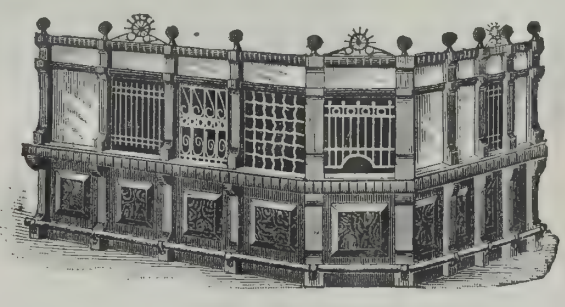
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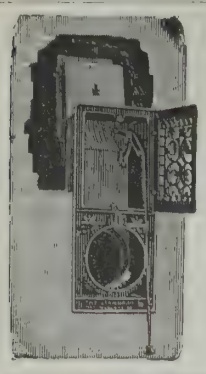
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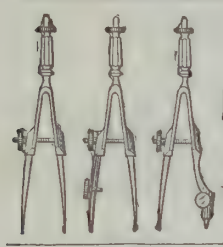


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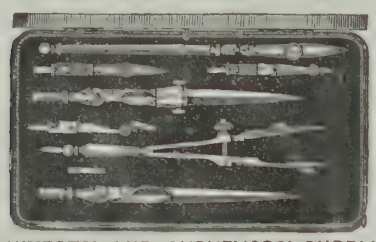
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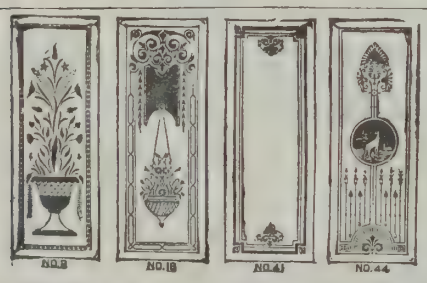
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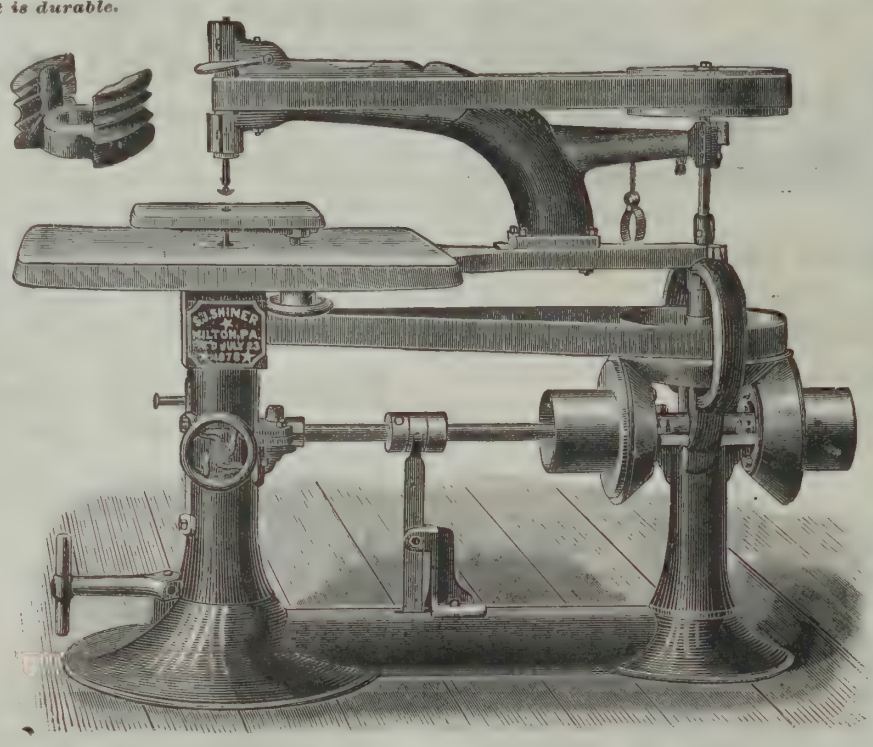


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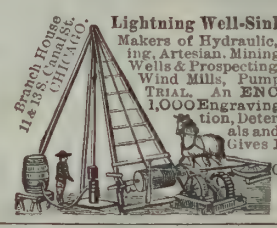
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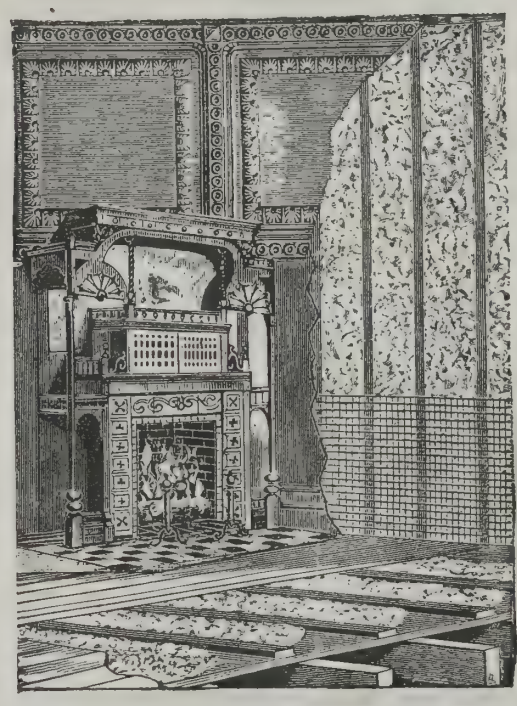
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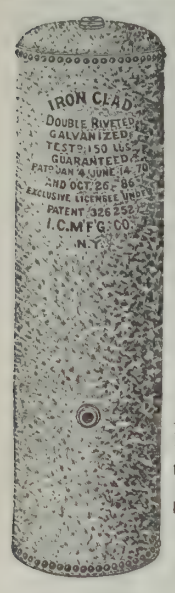
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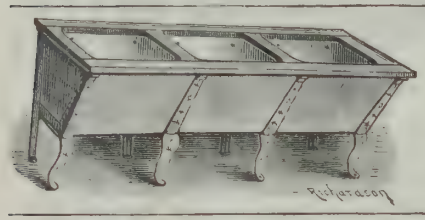
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Notes and Queries.

(1) G. F. C. asks how to make a good rosewood stain. A. Boil ½ pound of logwood chips in 3 pints of water until very dark, then add ¼ ounce salts of tartar. Stain wood with boiling hot mixture. When nearly dry, repeat. Two or three coats can be given. Streaks can be made on it with black stain applied with a graining brush. The black stain is made by boiling 1 pound logwood chips in 4 quarts of water and adding a double handful of walnut husks. After boiling, stain. Good ink may be used for the black streaks.

(2) F. I. S. asks: Can you tell me of anything that will banish Croton bugs from a house? A. Unfortunately we cannot. Paris green is efficacious, but is highly dangerous on account of its poisonous properties. Powdered borax, buhach or erythium, and Persian powder are all recommended.

(3) W. P. S. asks: What is the best cement for fastening leather to wood? Is leather to cover a box tightly put on while wet? A. Use a mixture of flour paste and glue. Apply the leather dry.

(4) T. J. L. asks: Can you inform me what will take a rust stain out of granite? I have tried oxalic acid, but after seven or eight days the stain returns. A. Try the effect of hydrochloric acid after the oxalic acid has been applied.

(5) E. M. writes: Clay is principally discolored by oxide of iron. Would an electro-magnet do much to purify same, provided the clay in a liquid state could be repassed very close to the poles of same? A. A magnet will not attract sesquioxide of iron. It might purify clay from pyrites if the latter were of the magnetic variety. In our SUPPLEMENT, Nos. 340 and 383, you will find articles on the subject of treatment of clays.

(6) W. G. S. writes: 1. Which is the right side to use tracing cloth with ink—the smooth or the dull side? A. Use the smooth side. 2. What remedy is there to prevent the ink from running? A. The ink should be thick, and the pen should be pressed lightly on the cloth.

(7) M. H. asks: 1. Is there such a thing as liquid vaseline? A. No. Kerosene and heavy paraffine oils may be taken as the nearest approach to it. 2. What is the most practical formula for determining the flow of water from an artesian well? A. Determine the head of water or pressure at the mouth, and apply the formula

$$\cdot 82\, a \sqrt{2gh}$$

in which a = area of pipe in square feet, and h head in feet, and $g = 32{\cdot}5$. 3. What is the formula for determining the number of gallons of water discharged per minute by a mountain stream? A. Determine its profile and the current velocity, and calculate the flow from these data. 4. For determining the number of gallons of water discharged per minute by a river. A. Determine its profile and the current velocity at different depths, and from these calculate the amount of water. 5. Can the magnetic variation be found by means of an ordinary compass, Jacob mounting, or ball and socket movement? A. Not very accurately. Works on surveying tell how to determine the true meridian, with which you can compare your compass. We can supply you with "A Practical Treatise on Surveying," by Gillespie, price $3.50. 6. What is the best method to preserve poplar trees from being worm-eaten, and what is the scientific name of the worm that destroys them? A. Spray with Paris green and water. For publications and information on subject, address the Department of Agriculture, Washington, D. C.

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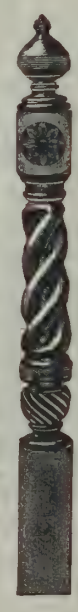


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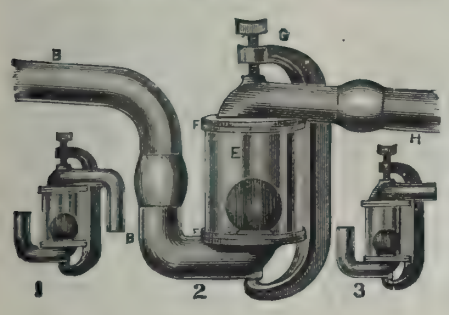
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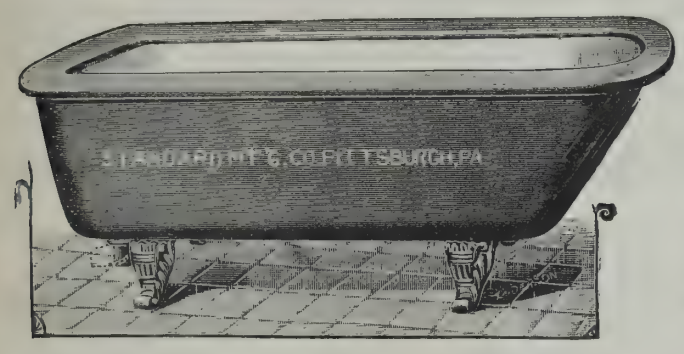
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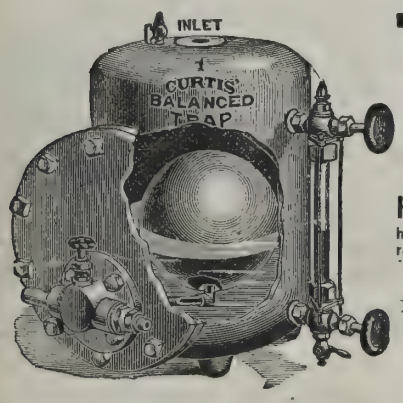
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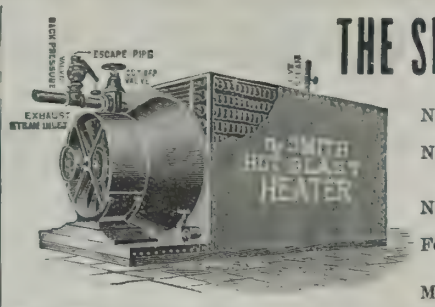
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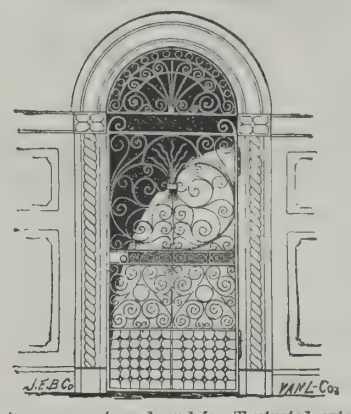
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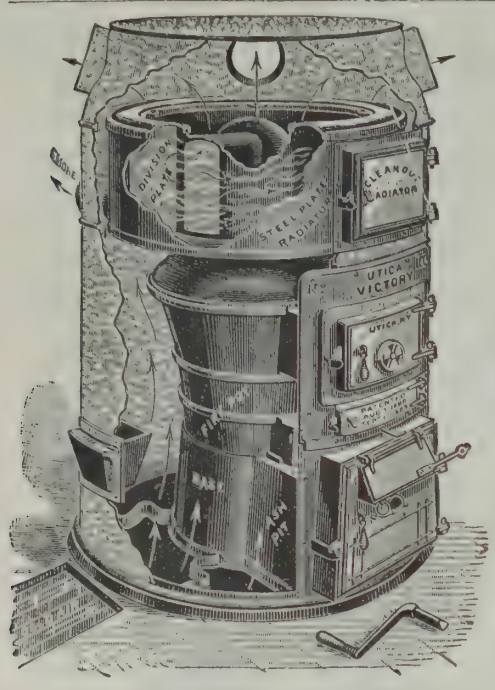


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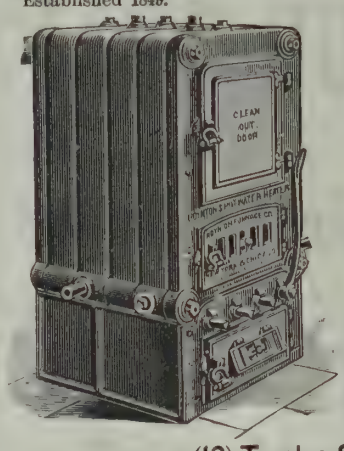
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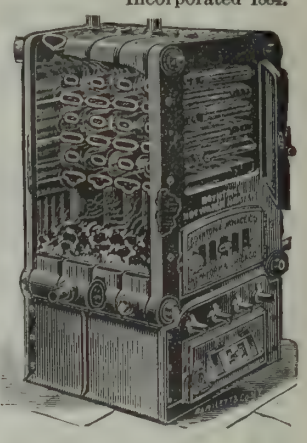
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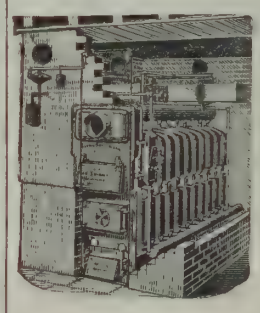
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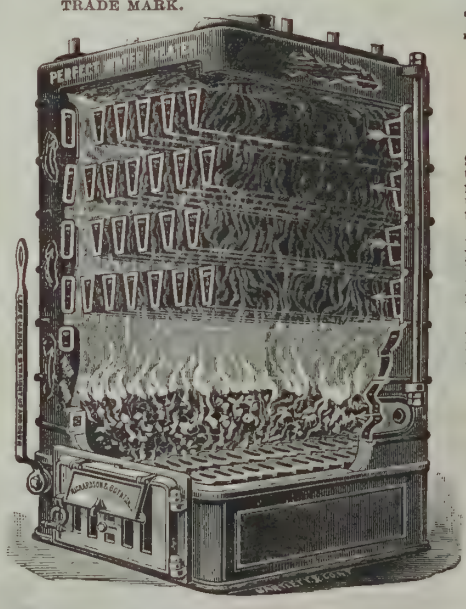
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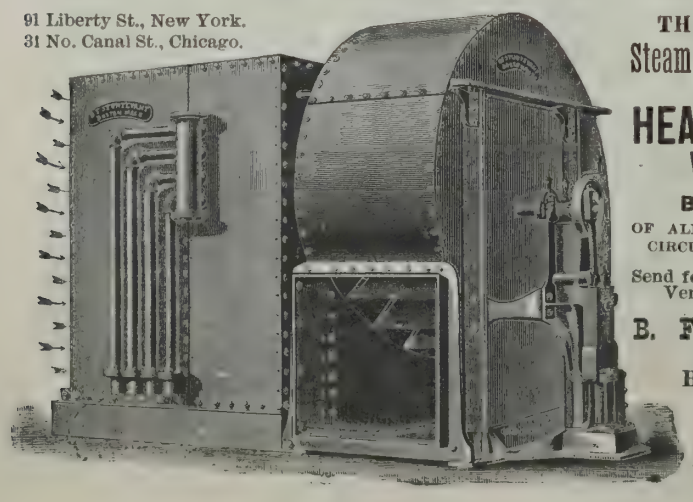
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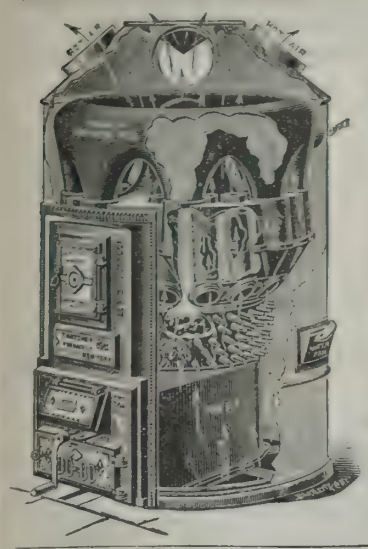
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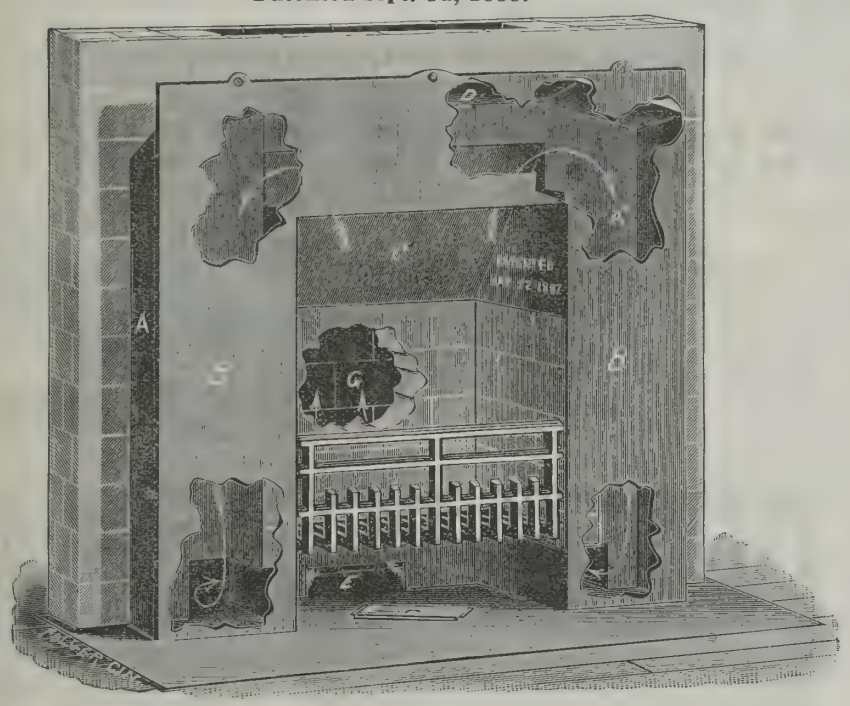


Figure 1.

Figure 1 shows a perspective view, the arrows in broken spaces showing direction of the draft which passes up under lintel D and thence right and left down the flues B B to the hearth, then back to chimney flue and up as shown by the arrows in broken space G in fire-wall. The opening E under fire basket, with door F being left out to show the end of arrows, is for the purpose of removing the soot that may accumulate from dropping down the chimney. Sloping back C and sides of fire-box are made of cast-iron so constructed as to receive the fire-brick or tiling, making a smooth, strong and durable fire-chamber.

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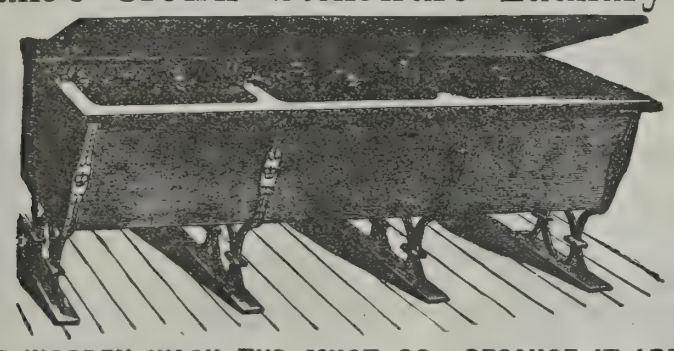
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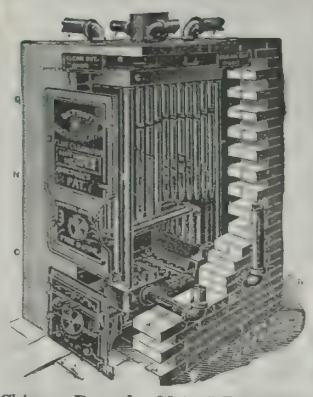
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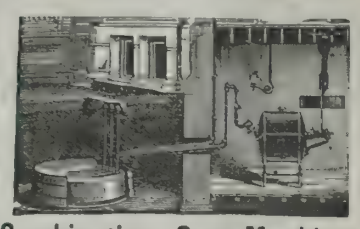
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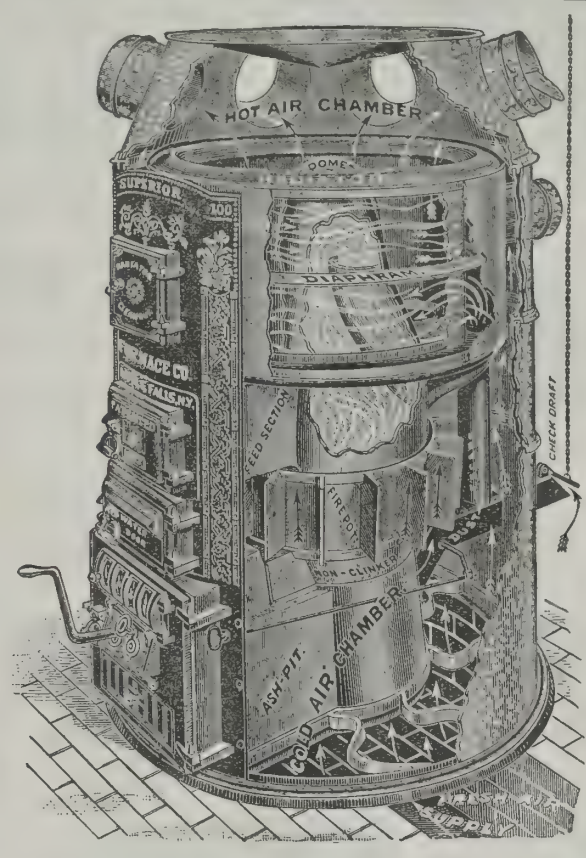


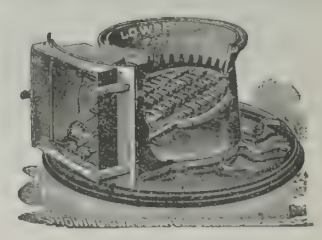
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Notes and Queries.

Continued from page vi.

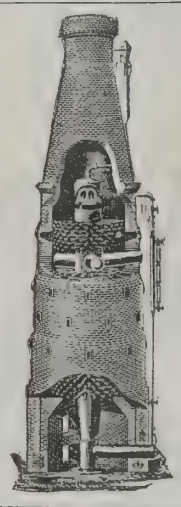
(8) D. J. R. asks for a good receipt for a black walnut stain. A. *a.* A decoction of green walnut husks dried and boiled in lye is recommended. *b.* Dragon's blood and lampblack mixed in wood alcohol may be used, well rubbed into the wood. *c.* One gallon strong vinegar, 1 pound dry burnt umber, ½ pound fine rose pink, ¼ pound dry burnt Vandyke brown. After mixing and standing for a day it is ready for use. Apply with a sponge.

(9) J. W. N. asks how to make a quick-drying polish to finish wood applied without friction. A. Dissolve 4 ounces best shellac in two pints strong alcohol, add 2 pints linseed oil and 1 pint spirit of turpentine, shake and add 4 ounces sulphuric ether (common ether) and 4 ounces aqua ammonia. Shake when used and apply with a sponge lightly.

(10) H. D. asks (1) for a remedy for ants in a pantry. Of course, nothing dangerous to man will answer. A. Try buhach or erythrum. See our SUPPLEMENT, No. 247. 2. A receipt for rubber stamp ink, both colors and indelible. Have tried various formulas published, but all lack proper body and staying qualities when applied to the pad. The indelible inks sold and made from various formulas come out in one or two washings at laundry, though they last some months in the home wash. A. Rubber stamp ink is made from aniline colors and glycerine. As an indelible ink the best printer's ink is to be recommended. 3. How do the collar manufacturers stamp their goods so that their trade mark can never be washed out? A. We presume it is with printer's ink.

(11) J. W. S. asks: What is the longest piece of carpet, 3 feet wide, that can be placed diagonally on the floor of a rectangular room 10 x 20 feet, and cutting ends of carpet square? A. 19 36-100 feet, approximately.

(12) W. A. B. writes: I am building a wooden aquarium, and would be much obliged if you would tell me the best cement to use in putting in the glass and also the best paint to coat the bottom with, to make it impervious to water? A. Use a mixture of Burgundy pitch 150 parts, old gutta percha in fine shreds 25 parts, finely powdered pumice stone 75 parts, for cement, and paint bottom with same. It must be applied hot, and a hot iron wire may be used to melt if into crevices, etc.



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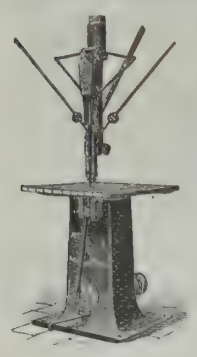
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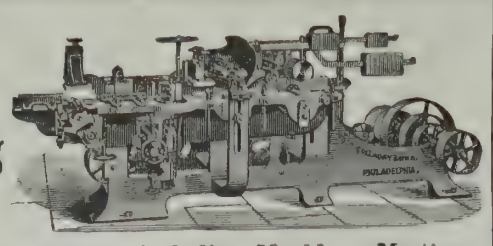
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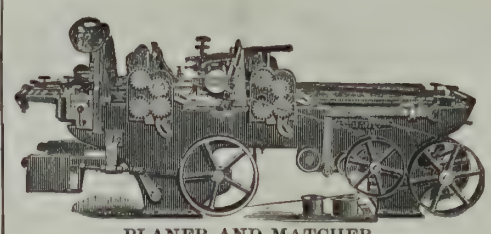


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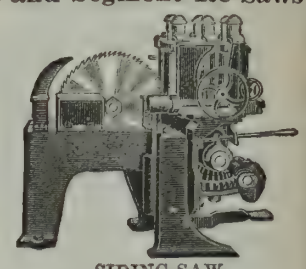
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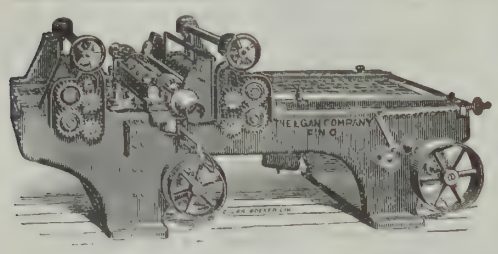


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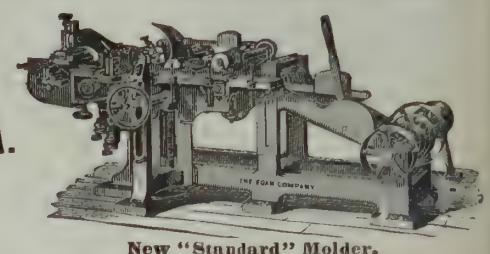
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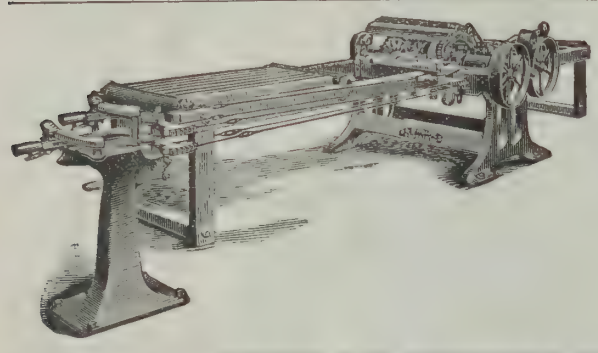


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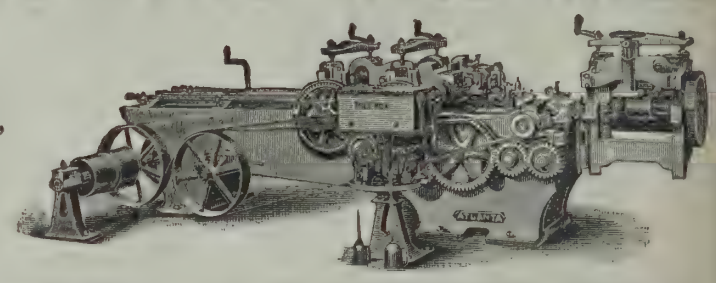
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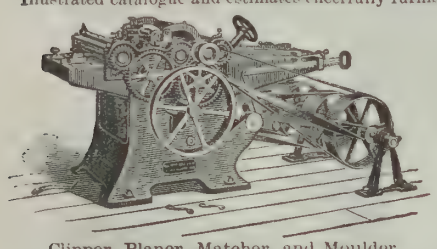


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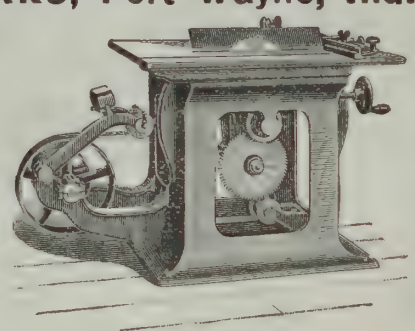
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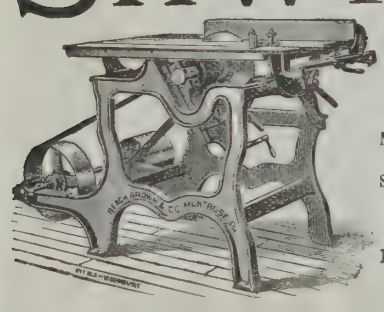
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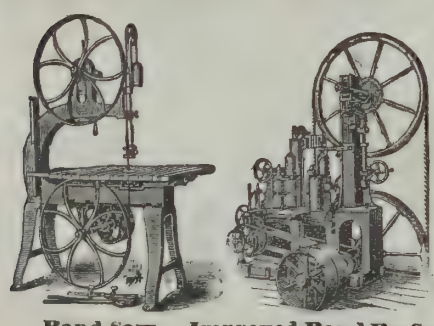
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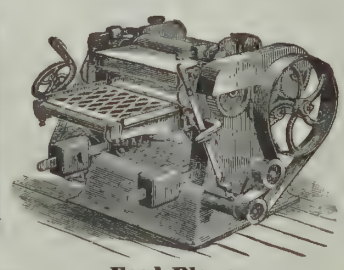
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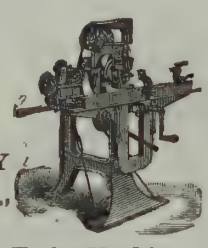
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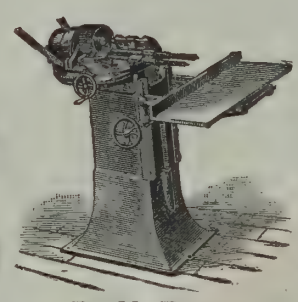
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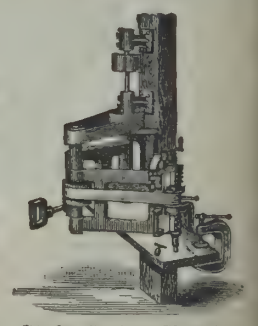
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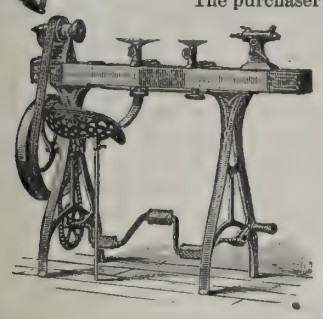
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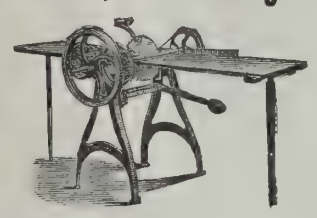
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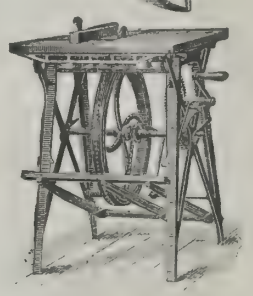
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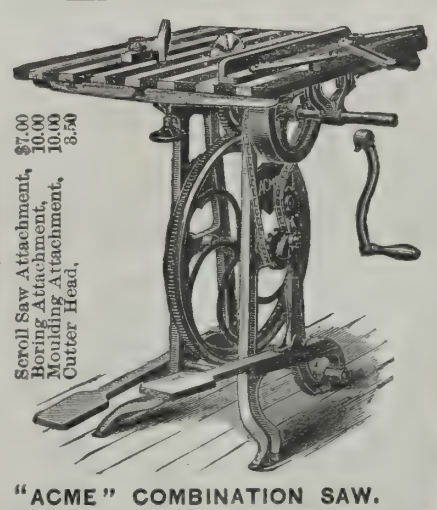
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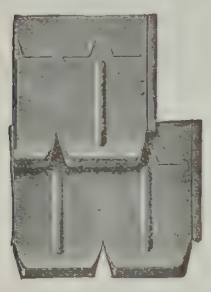
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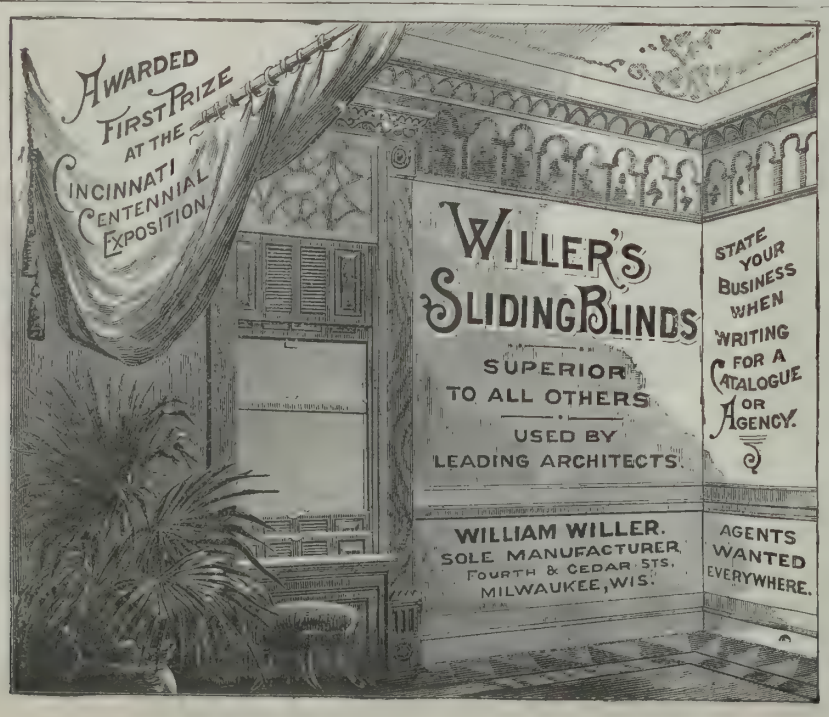
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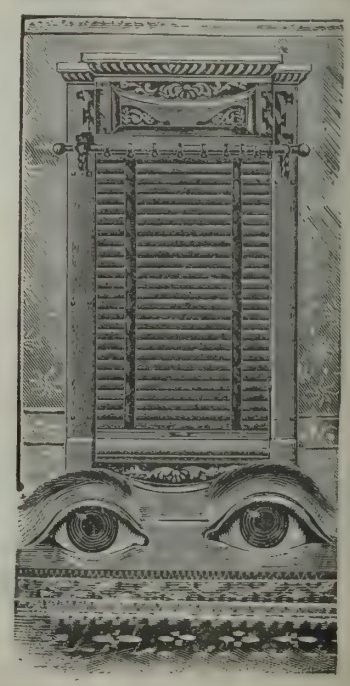
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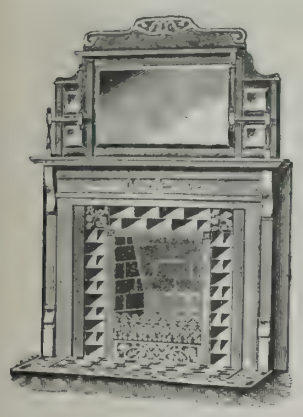
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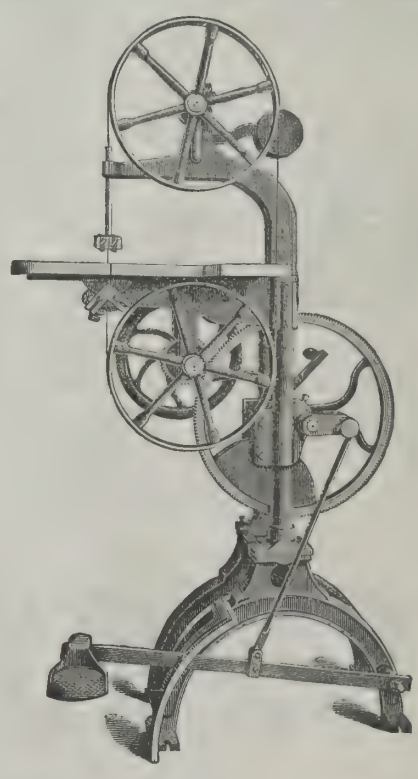
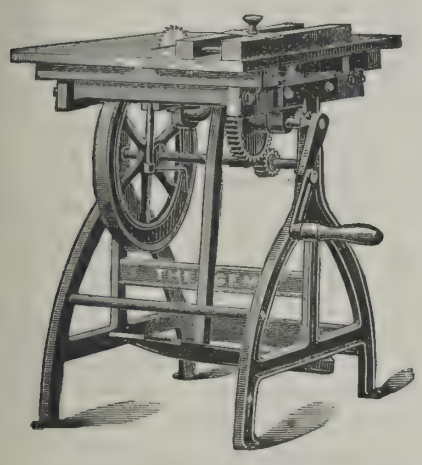


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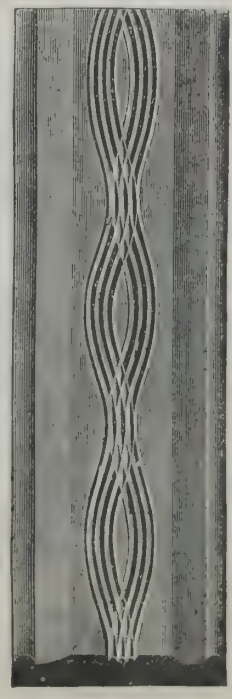
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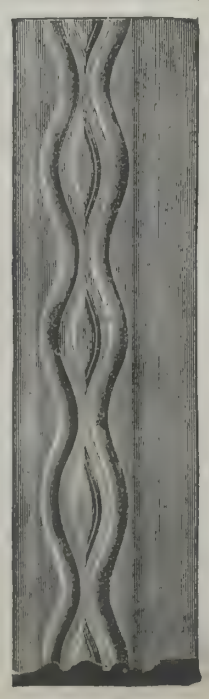
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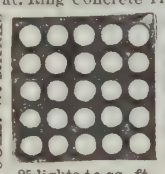
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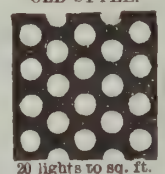
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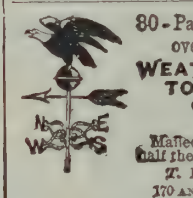
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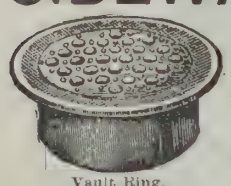
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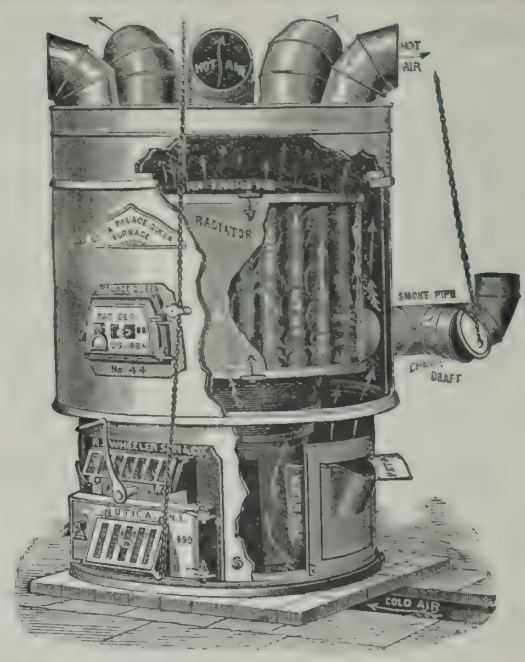


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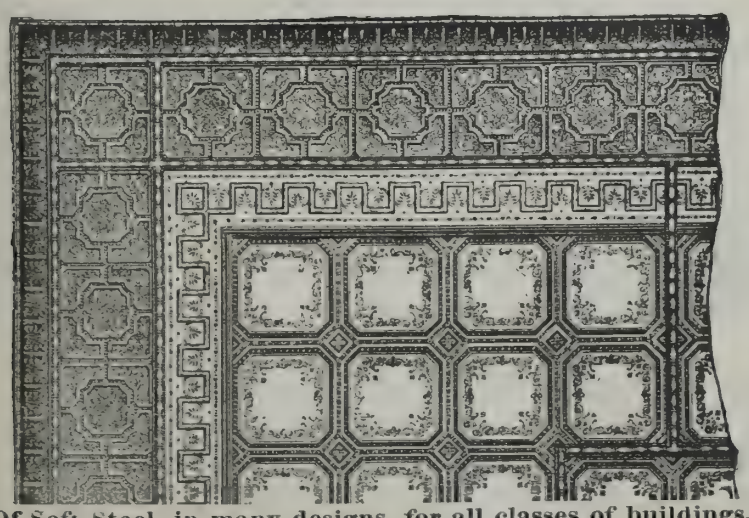
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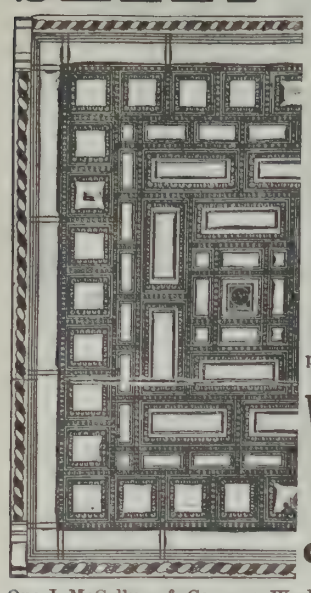
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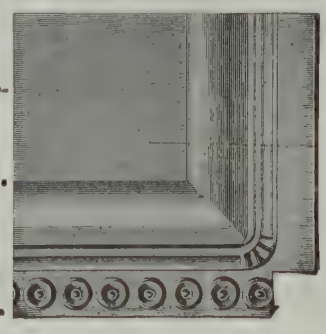
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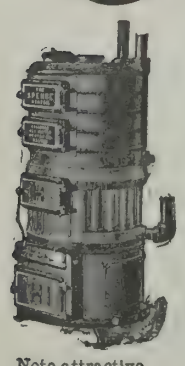
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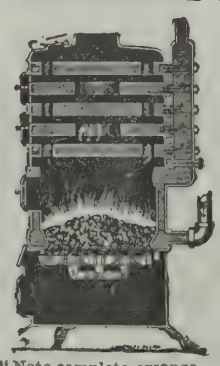
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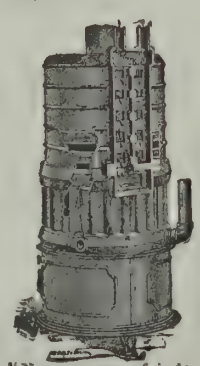
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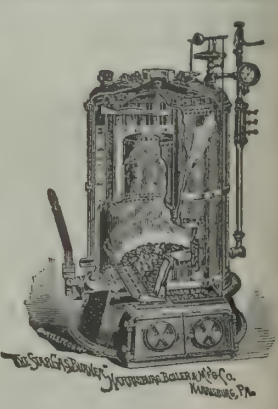
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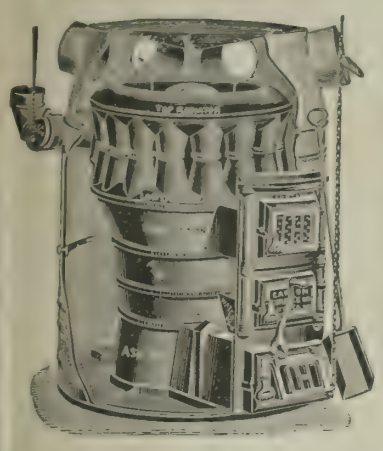
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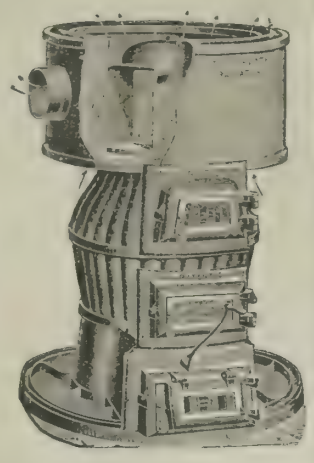
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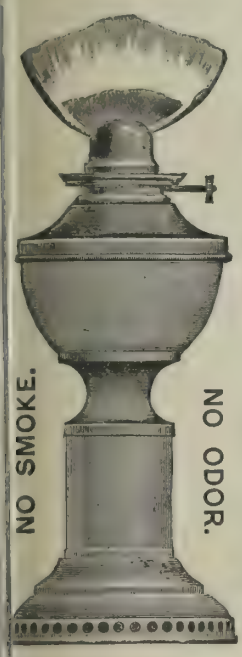
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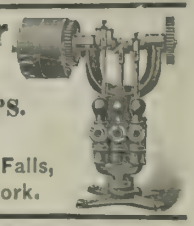
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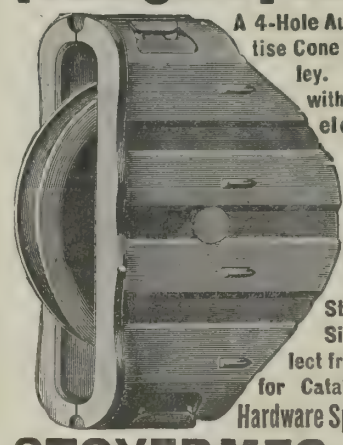
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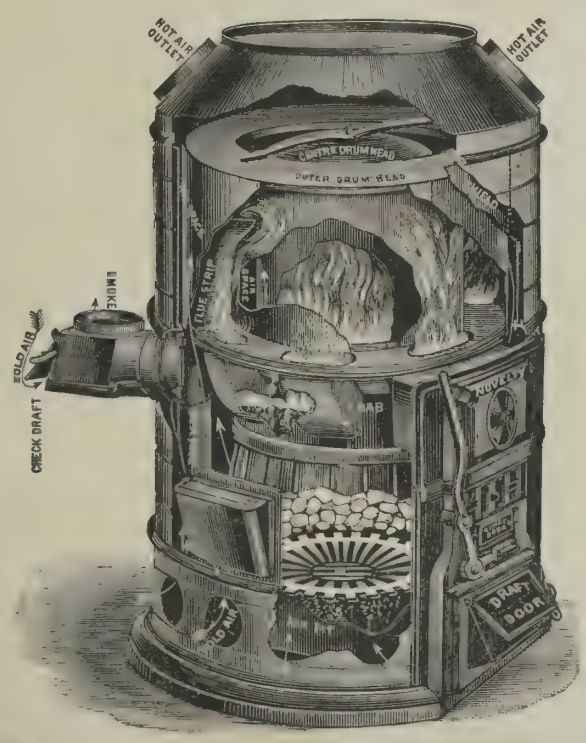
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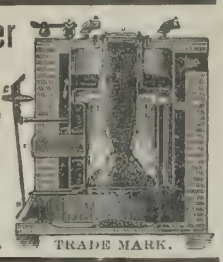
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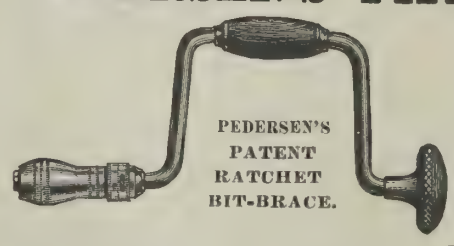
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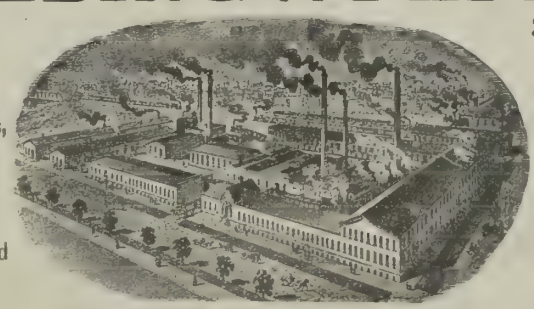
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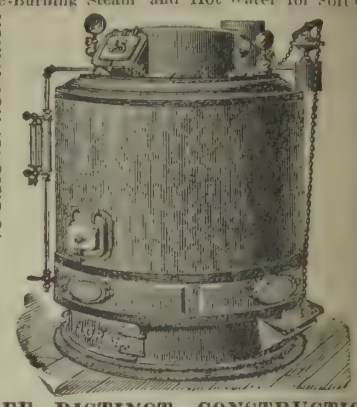
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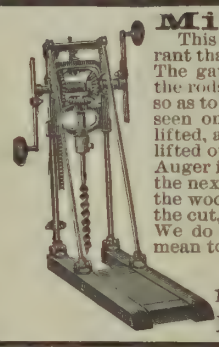
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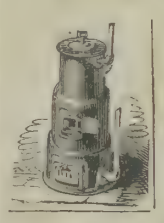
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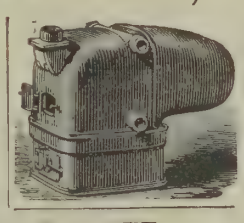
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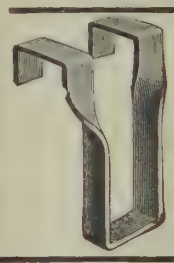
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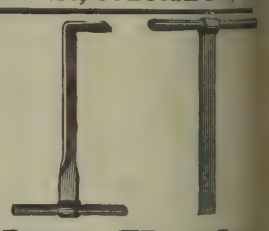


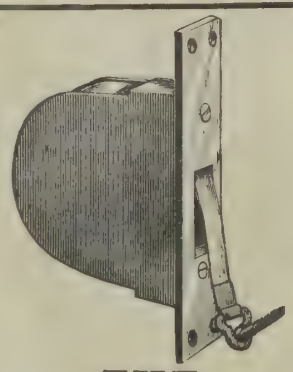
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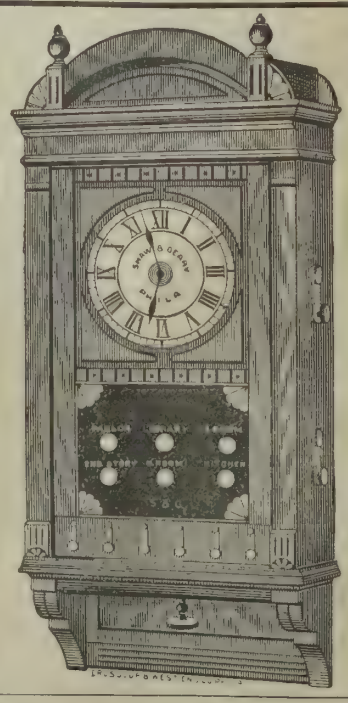
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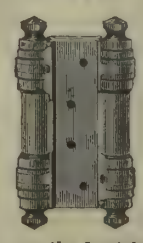
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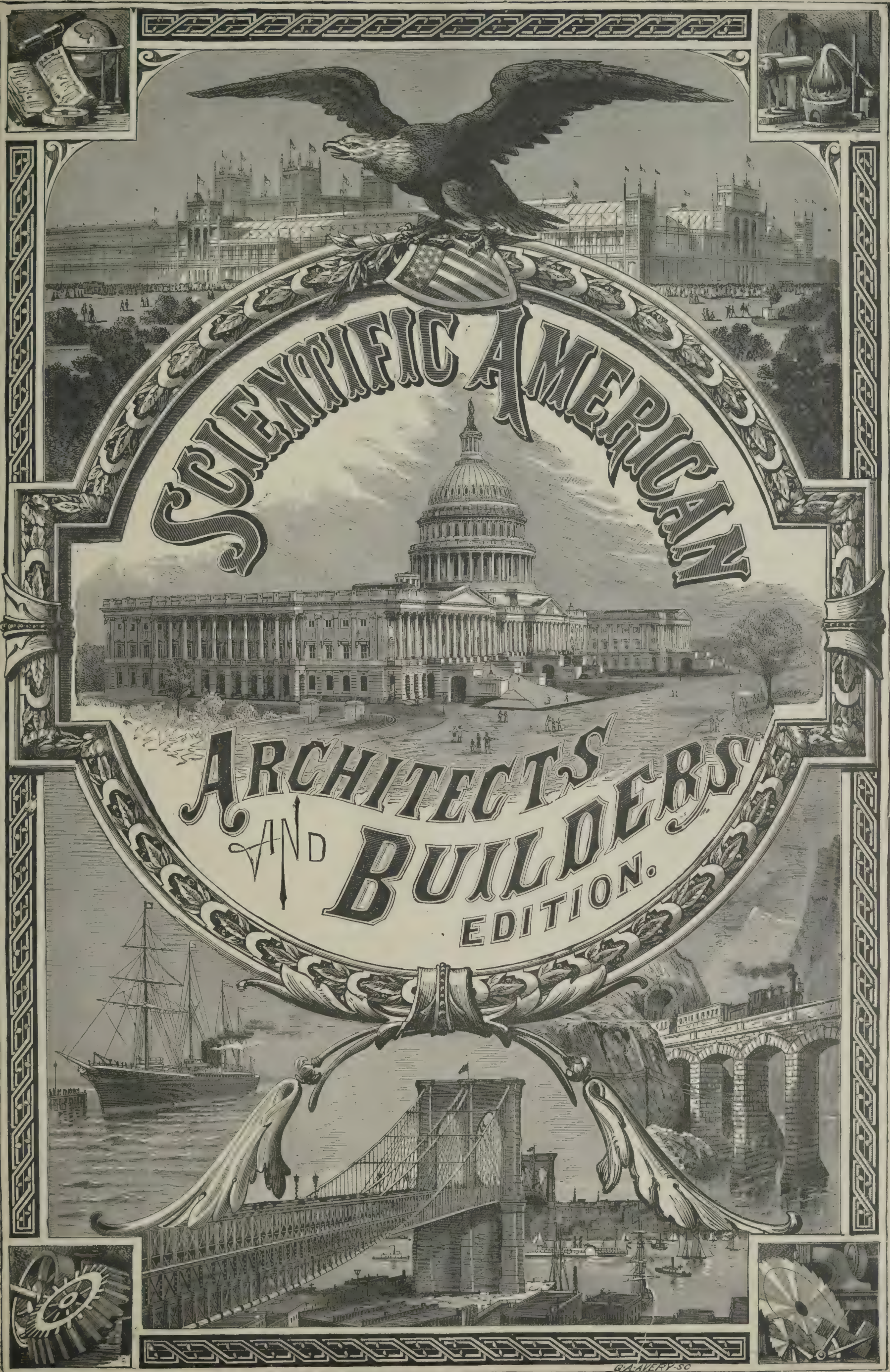
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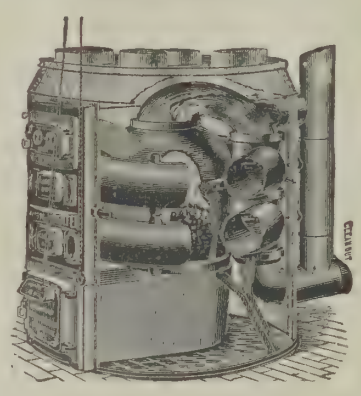
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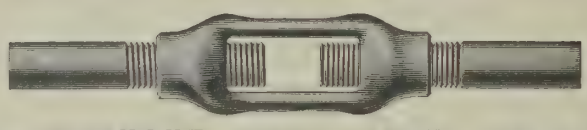
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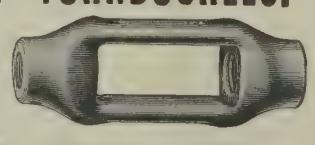
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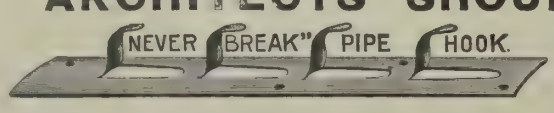
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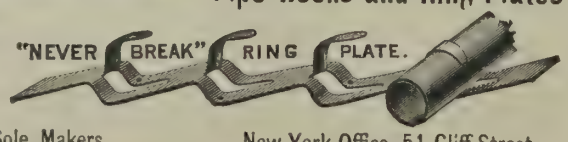


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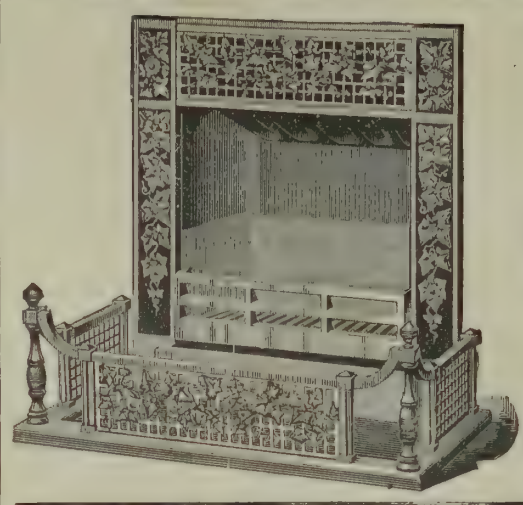


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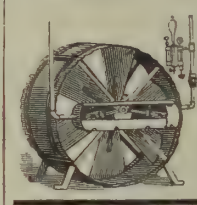
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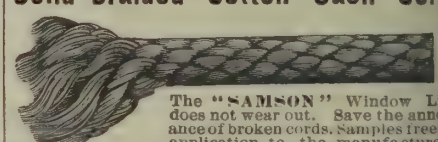


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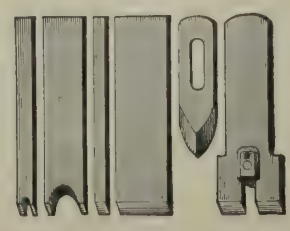
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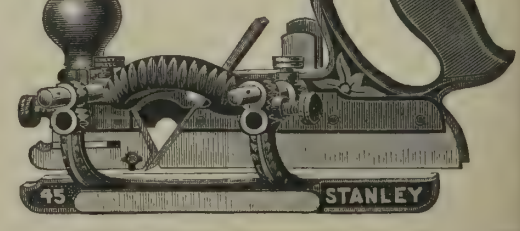
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A POMPEIAN HOUSE, AS REPRODUCED AT SARATOGA SPRINGS, N. Y.—[See page 54.]

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THE

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Of the October number of the ARCHITECTS AND BUILDERS EDITION of SCIENTIFIC AMERICAN.

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REPRODUCTION OF A POMPEIAN RESIDENCE.

The remarkable burial of Pompeii by the ashes thrown up during a volcanic eruption of Mt. Vesuvius, A D. 79, and the uncovering of a large portion of the buried city within recent years, have furnished us with much information that was unattainable from any other source, as to the social condition and surroundings and the manner of living among the better class of Romans of eighteen hundred years ago. The city was but little over a hundred miles from Rome, in southern Italy, in a location of unsurpassed beauty, and was a fashionable resort of the noble and wealthy, so that a large proportion of the buildings were on a magnificent scale and lavishly decorated. The manner in which the city was buried by the ashes had the effect of preserving, to a great extent, the actual form and appearance of all objects just as they were on the day of their entombment in the ashes of the volcano, many of the inhabitants being suffocated and their tolerably preserved remains fixed in the positions occupied by the individuals at the time in their several avocations. On this account excavations on the site of the buried city have been prosecuted with unusual interest, and in their revelations we seem to be brought face to face with actual life at a time when the glory of imperial Rome was at its height.

One of the many private houses thus uncovered by the excavations was the "House of Pansa," which has become among the best known from its great extent and the completeness of its plan. This structure has now been reproduced in Saratoga Springs by Mr. Franklin W. Smith, of Boston, the builder of the Moorish Villa and the Hotel Cordova at St. Augustine. Fla., and our illustration represents a view made direct from a photograph taken in the new-old house. The difficulties of the task have been very great, but they have been overcome by the employment of capable artists and the making of repeated visits to Pompeii, together with studies of the various collections in the Italian museums and the British Museum. Our view represents what is called the *peristylium*, a central court or hall with twelve columns inclosing a space with Pan and Satyr among the verdure. Here were given private entertainments, when the colonnade was festooned with garlands of roses and gay with birds of gorgeous plumage

Generally the houses of this period consisted of but one story, but with extra sleeping rooms over a part of the structure, and thus one such residence occupied a large ground area. On the roof of the front part of the building is the "solarium," or sun terrace, caryatides supporting trellises and vases alternating with them holding vines which grow in trained festoons around the roof garden.

On entering the vestibule the visitor is greeted by a fierce dog in reproduction mosaic. Beneath is the warning "Cave Canem." On the walls are brackets holding busts of "The Great and the Good," including Cicero, Socrates, Plato, and Homer. Drawing aside rich portieres, "Salve" in mosaic welcomes the visitor into the *atrium* or main hall. A bewildering vista stretches before him. Across the marble pavement to the fountain, through the *tablinum* to the group of pillars of the peristyle, across the *vecus* or banquet hall, to the rear walls of the *hortus*, or garden, nearly two hundred feet, the eye vainly struggles to absorb the details of ornament.

The beauty is enhanced by rich vases, frescoes, bronzes, statuary, and foliage, scattered in harmonious profusion in the main courts and in the wide halls opening on either hand. Passing through the spacious halls and courts, the visitor can follow in detail the life of the Roman noble, from his worship before the Temple of Jove in the Forum to the utensils of his kitchen or his pleasures, represented by carved ivory tickets, to his seat in the amphitheater. Every household article is executed with an artistic grace which reaches the acme of elegance. Even colanders and frying pans are decorated with graceful designs. The taste of these details proves a study of Greek art by the makers, whereas, in our mechanical age, the skill of the artisan rather than the artist is exemplified in household chattels.

A COTTAGE AT MONTCLAIR.

One of our colored plates this month illustrates a convenient and attractive cottage, of low cost. The cottage is located on a northwest corner lot 108 by 113 ft., fronting east. There is a cellar under the main part 6 ft. 8 in. high in the clear, with cemented bottom. The kitchen part is supported with iron columns. The cellar walls are 8 in brick, full height, cemented on the outside from the bottom to the top of the ground, to keep the dampness from striking through; all around the outside of wall at the bottom there is a blind drain leading to a given point, thence leading to a brook. This is intended to carry off all water which may settle at the bottom of the wall. From one corner of the cellar there is a 5 in. drain tile leading to a brook, and all the rain water from the roofs is connected and carried off through this drain. The main house is 24 ft. 2 in. front by 28 ft. deep. The kitchen part 13 ft. by 17. The first and second stories are 9 ft. high in the clear. The first story is divided into reception hall, parlor, dining room, kitchen and pantry. The second story is divided into four chambers, large clothes press and closets. The hall in second story is spacious for a medium sized house. The attic is floored only, except the hall, which is finished. In the attic there could be finished two large bed rooms and large closets. It is intended if the attic rooms were finished to utilize the room over the kitchen for bath room. It will be noticed all the bed rooms enter directly from the hall, and all rooms communicate with each other.

The exterior of house is sheathed, papered, and covered with beveled clapboards, with band and two courses of ornamented shingles at the bottom of the second story windows. The gables are shingled and ornamental courses worked in. The main roofs are covered with 6 in. × 18 in. sawed cypress shingles, laid on spruce lath. The piazza is 8 ft. wide, floored with 3 in. flooring, and ceiled overhead. The bay windows in parlor, hall, and the two rooms over finish under the main cornice, making altogether an attractive feature. All the windows except the attic, cellar, and bays have outside blinds. The house is painted in two tints of yellow shades and cut in with red and brown The interior trimmings are western whitewood, including the stairs. Interior doors are white pine; outside of front door, quartered oak. The hardware for principal part of first story is plain bronze, balance jet and bronze, and Boston finish butts. The newel rail and balusters at bottom of main stairs are cherry. The balustrade on second story and attic stairs are whitewood. All the interior is finished in the natural. The dining room has cherry mantel and summer piece. The house is heated with a large sized Groff hot air furnace. There is sink and pump in the kitchen supplied from well. The house can be built as it stands for $2,800. Munn & Co., architects, New York. For sheet of details see page 63. Our engraving was made direct from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

A LONG ISLAND RESIDENCE.

We illustrate, in one of our colored plates in this issue, a residence recently erected for Mr. E. J. Johnson, at Hollis, Long Island. Dimensions: Front, 34 ft; side, 47 ft, not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft. First story clapboarded; the balustrade and columns to piazza, second and third stories and roof are shingled with slate quarried at Bangor, Pa. The trim throughout is of whitewood; hall stained and finished in oak; parlor and library in cherry, dining room and rest of trim finished natural. Floors of yellow pine, laid in narrow widths. Hall contains an ornamental staircase, and an open fireplace faced with tiles and capped with a slate shelf; hearth of tiles. Parlor, library and dining room each have fireplaces with tiled hearths and facings, and elegant slate mantels with plate glass mirrors, etc. Kitchen and pantries are wainscoted, and provided with wash trays, sink, etc., complete. There are five bedrooms and bathroom on second floor. The third floor or attic is not partitioned off, but several rooms could be finished if desired. There is a cemented cellar under whole of house containing furnace. Cost, $5,500, complete. Schwietzer & Deimer, New York, architects. On page 66 we give a sheet of details. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

Building in 1889.

The money actually expended annually in the erection of new buildings in the United States can scarcely be realized by those who give no attention to the business. The following table, compiled by the *Weekly Record*, is an interesting schedule of what was done in 1889:

Cities.	No.	Cost.
Baltimore	1,955	$3,600,000
Boston	4,431	32,400,000
Brooklyn	*4,500	25,679,405
Charleston	225	294,575
Chicago	4.931	25,065,500
Cincinnati	2.104	4,143,214
Cleveland	4.007	4,401.854
Denver	2,741	10,807,377
Duluth	240	2,480,800
Indianapolis	1,800	4,500,000
Jersey City	930	2,930,857
Louisville	992	1,746,383
Milwaukee	1,624	4,610,000
Minneapolis	4,355	8,737,281
Newark	1,541	†5,000,000
New Haven	628	2,066,700
New Orleans	1,061	1,465,105
New York	6,722	75,912,818
Omaha	2,498	4,663,735
Philadelphia	11,965	26,000.000
Pittsburg	3,241	†8,000 000
St. Joseph	1,181	1,413,067
St. Louis	3,544	9,765,700
St. Paul	3,756	7,939.493
Toledo	300	1,500,000
Washington	4,048	6,165,715
Wilmington	522	866,980

* Number estimated; cost actual. † Estimated.

This gives a total for twenty-seven cities of 75,842 buildings, costing $382,155,557, being an increase over the preceding year of 9,721 buildings, and $42,749,628 cost

The Growth of Cities.

The results of the census show that the larger cities, with few exceptions, have grown rapidly during the last decade. Those of great commercial and industrial importance, like Chicago, New York, Boston, Brooklyn, Philadelphia, Baltimore, Cleveland, St. Louis, Kansas City, the Minnesota twins and San Francisco, have increased in population from 50 to 100 per cent. The final figures will doubtless present a commensurate gain in manufacture, trade, and wealth. Smaller cities have also made a rapid growth, the increase in many instances showing a percentage equal to that of the larger places. It is especially noticeable that the more thriving and progressive cities have grown since 1880 much more rapidly than they did during the preceding ten years. This is explainable from the fact that the time from 1870 to 1880 was one of financial and trade depression, when the country was recovering from the effects of the civil war, an inflated currency and a collapse of property values. During the past ten years the country has been generally prosperous, business safe, and wealth has steadily and, in many instances, rapidly accumulated. The massing of capital has led to vast investments in railroad, construction, mining, manufacturing and trade. This has given employment to millions of people, induced the immigration of about 5,000,000 souls from Europe, and hence rapidly added to the population of cities and towns. While the rural communities have also increased in commercial strength, such augmentation of population has] not been proportionate to the growth of the cities.

It is the habit of writers on economic questions to deplore the tendency of population into the cities and towns and the prevailing distaste of the younger people of the agricultural class for the occupation to which they were born and bred. It has become axiomatic that the basis of the nation's prosperity is in the cultivation of the land and the rearing of live stock. Earnest individuals of a contemplative and prophetic mood proclaim that the country will eventually go to ruin unless there shall come a reaction in favor of farm life. They hold this opinion on moral as well as economic grounds, because they assume that Roman virtue cannot exist in vigorous character except in a community of farmers. In a material sense such prophets take the position that the commercial and manufacturing centers must depend on the farming communities for a market, and that a decline in agricultural prosperity will eventually react to the detriment of urban thrift and growth.

This theory is to some extent true and provable, but it has its limitations. At least no such danger as has been indicated has yet come to view. The uses of agricultural and grazing lands are to furnish the entire population with enough food and textile products—raw material—to sustain life, keep the manufactories going, and maintain stocks of goods in the markets. The cities are the mills in which all the raw material is turned into usable forms. For this purpose it matters not whether the product is grown on one million or a hundred million of acres. It is likewise a mistake to assume that the market for food and manufactured goods is mostly dependent on rural communities. The cities and towns contain the bulk of population, and are by far the greatest consumers of the product of the soil and the factory. Workers in the cities receive their wages weekly or monthly, and they usually spend them as fast as received. The cash trade of the country is in the manufacturing and trade centers. For this reason, so long as there is enough raw material furnished from the land, the cities will continue to grow, though the farming class may not advance in wealth or numbers. The cheaper the raw material becomes, the more the manipulators of it in the cities are likely to thrive; for cheapness means abundance and a low cost of the necessaries of life.

It is not meant by the foregoing that a prosperous farming community is not conducive to the general prosperity. If every farmer could be a man of wealth, and a lavish buyer of the goods produced in the cities, such a condition would add that much to the demand. But the doctrine that there are too few farmers, and too much crowding into the cities, is one open to question. If the markets are now overfull of farm products, as they appear to be, judging by the low prices that have prevailed for several years past, how would it benefit the farmers' condition if one-third or one-half of the population of the cities should rush into the country, and thus help to swell the already excess of supply? The rapid growth of the centers of population, industry and trade is really likely to be the salvation of our agricultural interests. Every man, woman or child earning wages in store, office, factory, is a consumer of food products as well as a producer of goods.

Another feature of the situation is the fact that the building up of great cities, with their hundreds of thousands of people in each, affords opportunity for a denser farming population in their immediate vicinity. It requires a vast amount of vegetables, fruits, dairy products, etc., to furnish such cities as New York, Chicago, Philadelphia, Boston and the others of the greater magnitude. This tends to farms of the smaller but more highly cultivated class, within a radius of 100 miles of such centers. With large markets, cash sales, and comparatively low cost of transportation, the tillers of the soil, thus situated, are in a position of prosperity and thrift. The larger the cities become, the greater will be the number of food producers in their immediate vicinity.

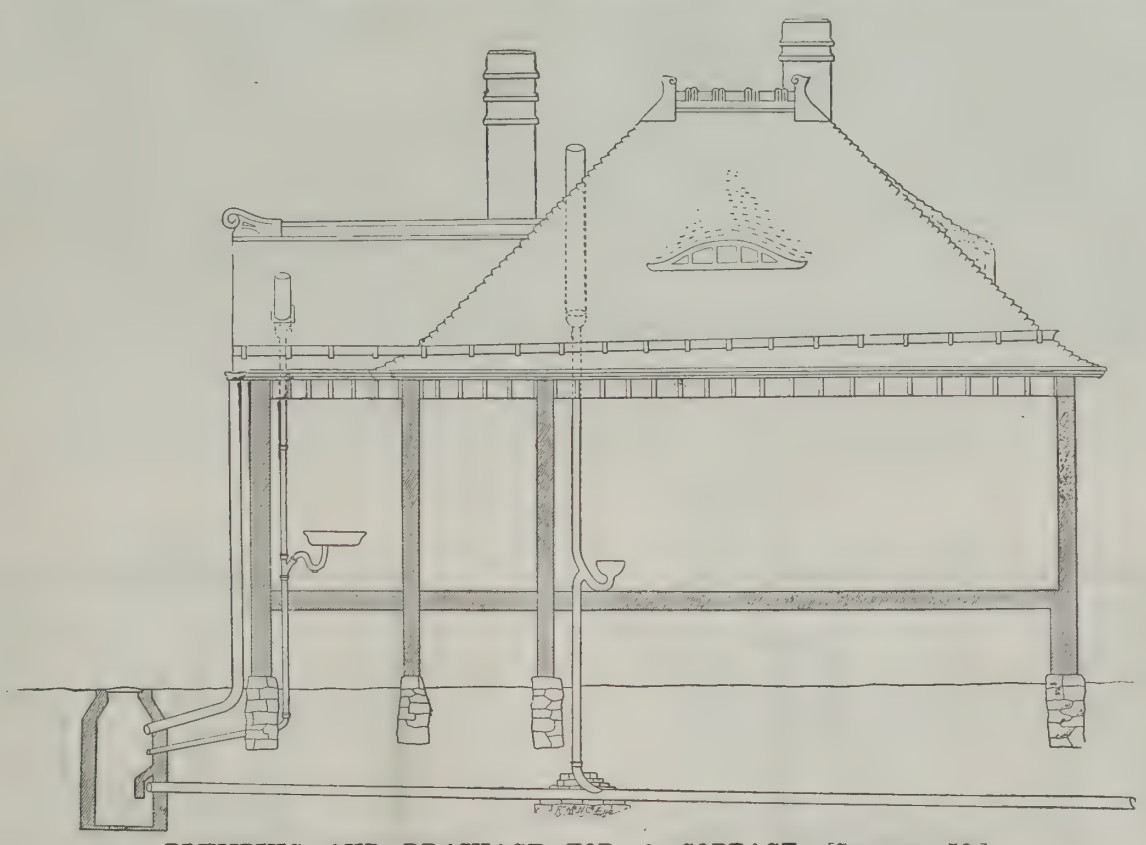
Se let the cities grow and pile up the figures of increase with each decennial census. Such enlargement of population means general prosperity. A poverty-stricken section of country is that where there are no large cities, and where towns that do have an existence are stagnant in respect to enterprise, do not increase in population.—*N. W. Lumberman.*

Treatment of Oak.

Oak has always been considered a slow wood to get ready for market and consumption, and difficult to season on account of its liability to check in that process. For this reason dealers in this wood have not been able to handle it rapidly, and have been obliged to use much care in piling and shipping so as to prevent the depreciation in value. Owing to this, dealers in oak have calculated to hold a sufficent margin between the buying and selling price to insure a fair profit. They have always insisted that there was so much loss in grading and the depreciation of stock, and the stuff had to be carried so long before being sold, that anything less than an average of $5 a thousand between the mill and yard was considered inadequate.

Within two or three years, or since oak became so largely used for furniture and finishing purposes, there has been an increased urgency toward handling stocks more rapidly than previously. Consumers who had large lines of goods to turn out and keep on the market, and house finish manufacturers who had contracts to fill, became impatient of the slow process of air drying, and brought the kiln into requisition. But that as an auxiliary in the finishing off of lumber, after it has been on sticks for a few weeks, has become too slow a method to suit operators. Especially when the demand is urgent and dry lumber scarce, it is desirable to get lumber forward from the saw and into the hands of the manufacturer as quickly as possible. In pursuance of this object, operators have been looking about for the means of quick drying that will be effective and at the same time preserve the quality of the wood. It is claimed by many that a kiln that steams the wood, and that at the same time, by strong currents and rapid condensation of moisture, completes the drying process, is the best means of treating hard wood when speed is the requisite in order to meet market requirements. It is claimed that green oak can be thus treated where the lumber is to be used for furniture and finishing purposes. Steaming prevents checking, deprives the grain of its obdurate character, and the wood remains thereafter free from splits and checks. It is argued that the reason why air dried oak splits and checks badly is because it becomes dry and case-hardened on the outside while the inside is still green. Before the moisture escapes from the dry and hard exterior it forces the grain apart, resulting in the defects named. Splits and checks will close up when the lumber becomes perfectly dry, but that requires a long time, as every handler of hard wood knows. While the dealer is waiting for his lumber to recover its normal state, the interest on the money invested, and the other expense of carrying, is working against the dealer's profits.

Men of experience in the handling of hard wood logs and the manufacture of lumber know that when logs are long soaked in water they turn out much better sawed stock than those that are not thus treated. Logs that float in the streams long distances to the mills, and remain months in the water, produce excellent lumber, that sells higher than dry land stock, in case the purchaser knows the difference between the two kinds. "Water oak," as that from soaked logs on the Ohio is called, is always held in high favor. It is claimed that inch lumber cut from a log thoroughly soaked can be dried ready for the consumer, or for shipment, in 30 days. It is also claimed that it does not split or check so as to be at all troublesome. This assumption can probably be fully substantiated. Granting this, it suggests a way whereby the quality of oak can be improved, and the handling of sawed product can be greatly accelerated. In every case where a reservoir can be secured contiguous to a mill, it should be a depository of logs held in reserve for sawing. Of course, small operators, remote from water, and depending largely on portable mills, cannot for a moment consider the log-soaking process. But they can do this when sufficient water is available—soak their lumber thoroughly before it goes into pile. It makes but little difference whether product is soaked in the log or after it has been converted into lumber; the result is about the same. Soaking logs and lumber and steaming in the kiln have much the same effect on the lumber, and it is altogether beneficial. Thus operators have means, adapted to their various situations and capacities, to treat their lumber so as to prevent depreciation of quality, add to its workable value, and hasten the process of preparation for market.—*N. W. Lumberman.*



PLUMBING AND DRAINAGE FOR A COTTAGE.—[See page 58]

THE house once occupied by Governor Endicott, which was recently torn down in Salem, Mass., was one of the oldest in the commonwealth. It is said to have been first framed in England, then brought across the ocean and set up in Gloucester. In 1628 it was purchased by Endicott and taken apart, removed to Salem, and rebuilt on what is now the corner of Washington and Church Streets. After the governor's death, in 1665, it was still for some time occupied by his family, and for a while the sessions of the General Court were held within it. Afterward it was moved a short distance away, and went through many vicissitudes, its last service having been as a storage house. Its timbers were found to be of English oak of great size and still in apparently perfect condition.

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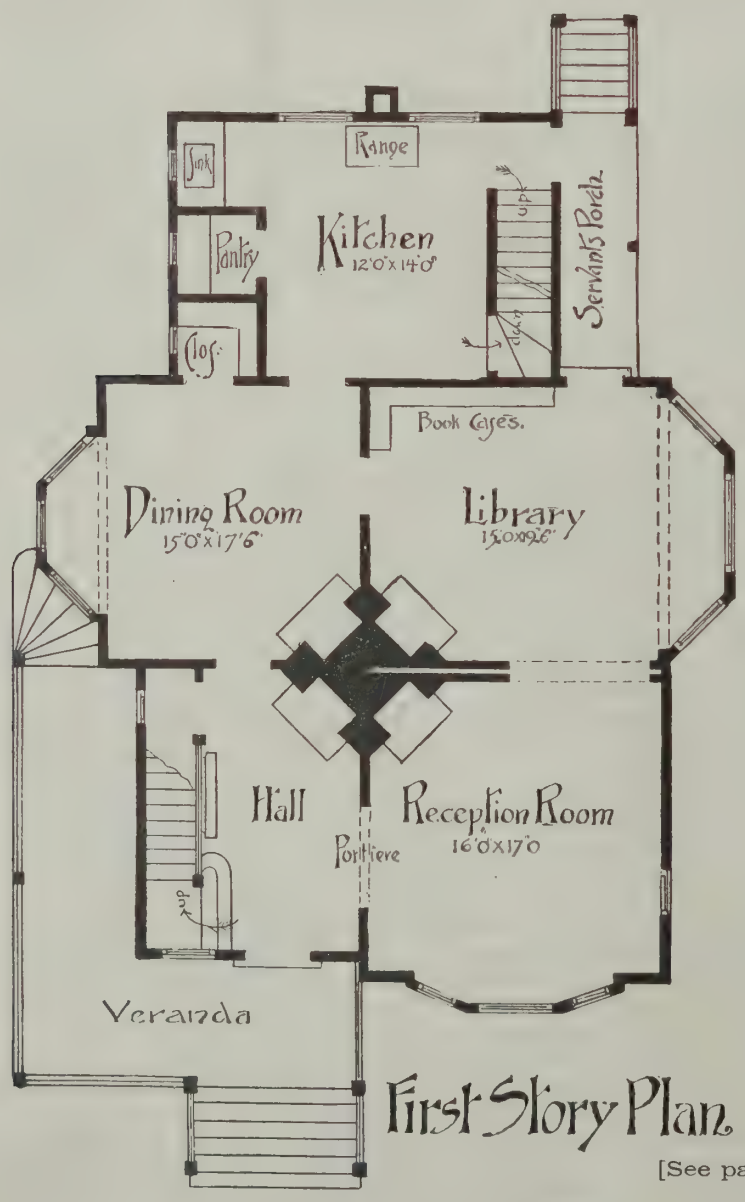
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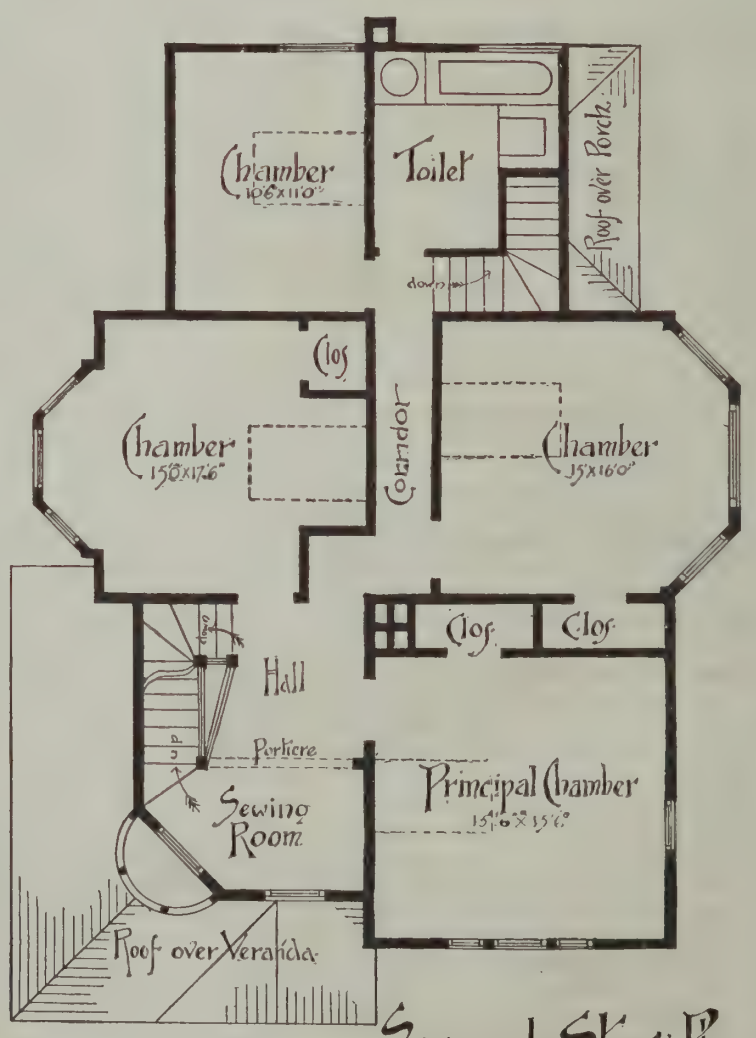
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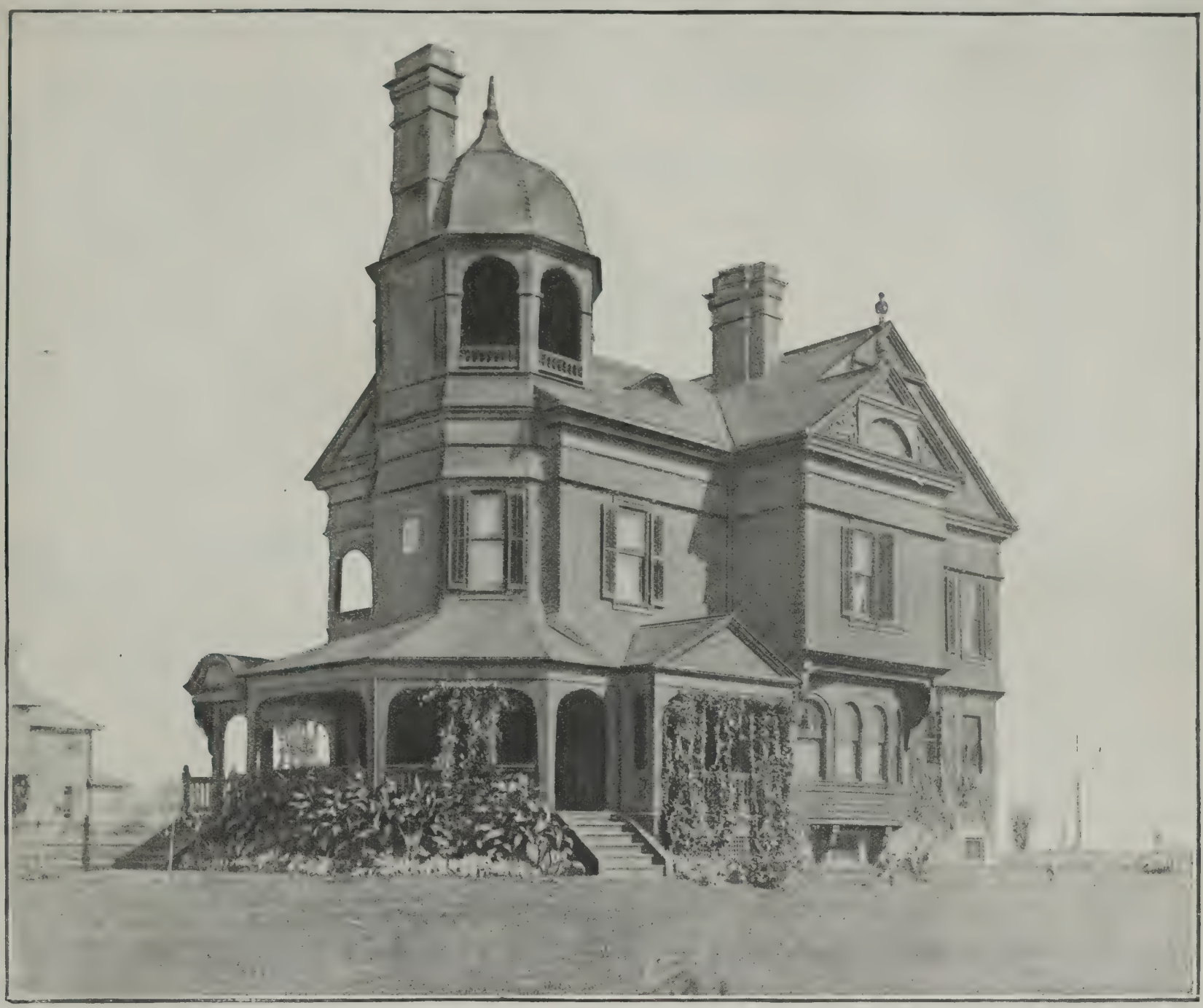
First Story Plan.

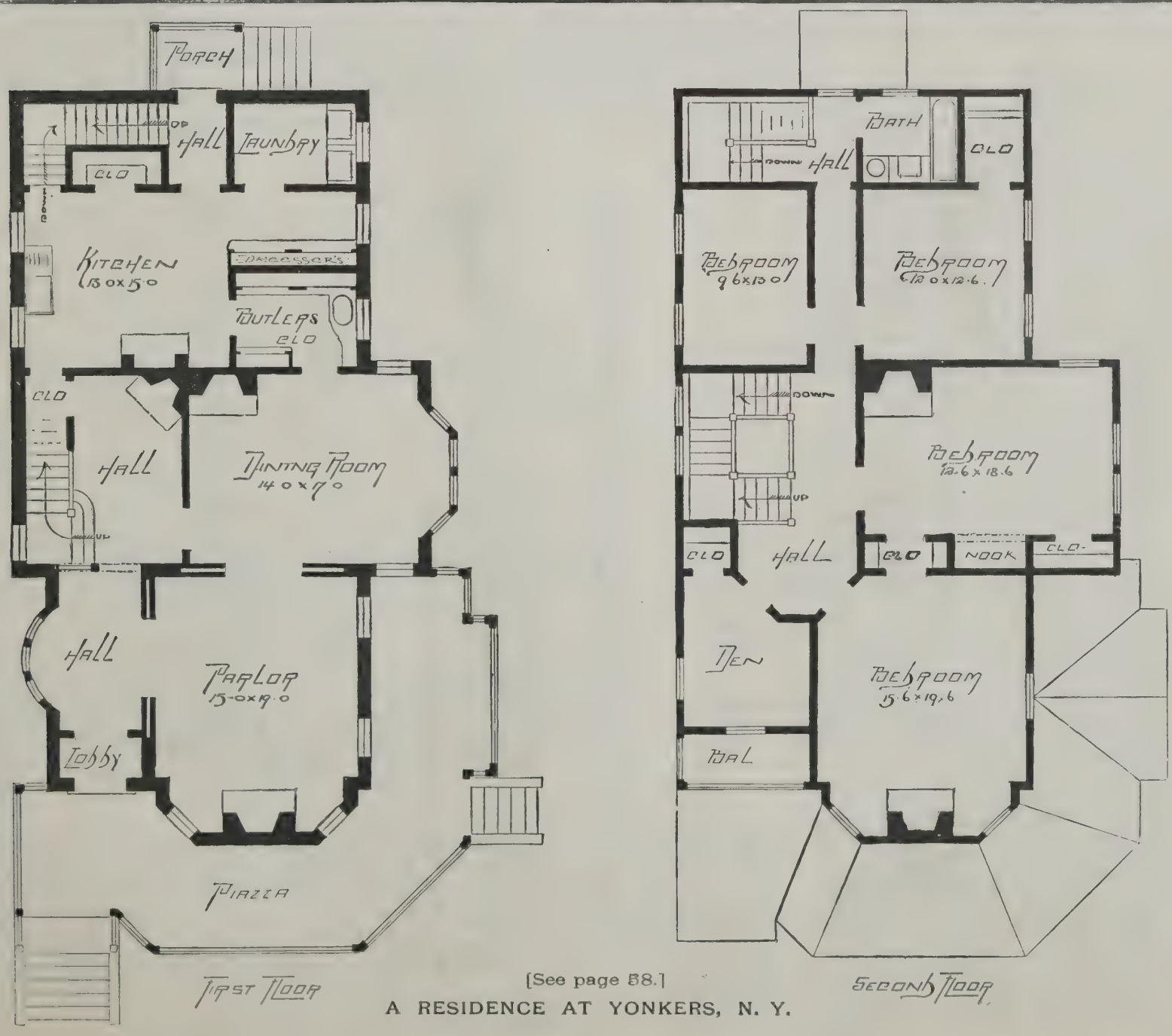


Second Story Plan.

[See page 58.]

Suburban Cottage for Five Thousand Dollars at Chicago, Ill.



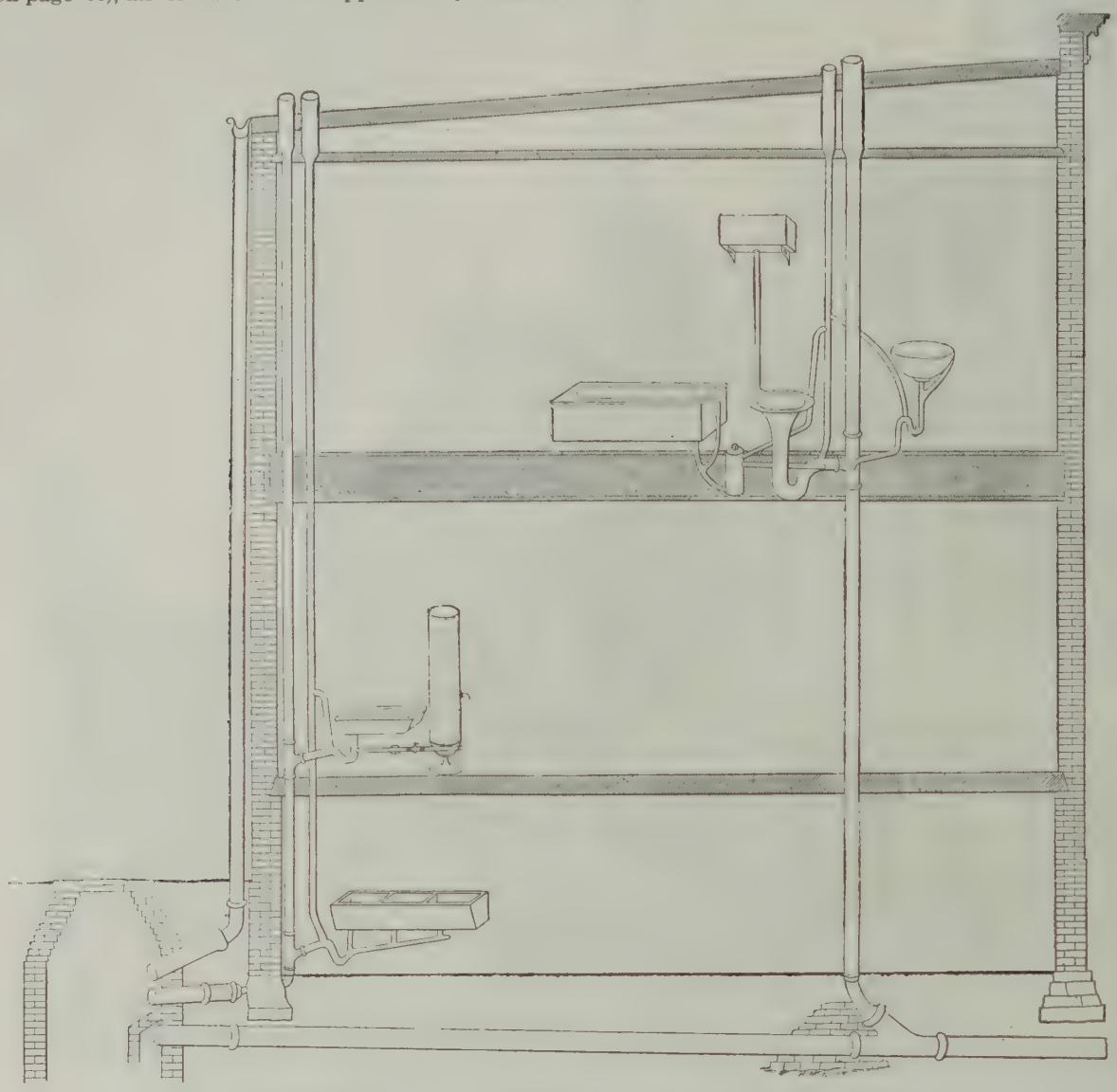


[See page 58.]

A RESIDENCE AT YONKERS, N. Y.

EXAMPLES OF PLUMBING AND DRAINAGE.

We give from the *Sanitary News* three examples of plumbing and drainage. One relating to a flat, another to a city house, and the other a cottage (the latter on page 55), all of which were approved by Swayne Wickersham, Commissioner of Health, and Andrew Young, Chief Inspector, Health Department, Chicago. The drawings speak for themselves, and will be readily understood.



PLUMBING AND DRAINAGE FOR A CITY HOUSE.

A SUBURBAN COTTAGE FOR $5,000, AT CHICAGO, ILLINOIS.

We publish on page 56 a plate with two floor plans of the cottage of J. R. Embree, Esq., on Harvest st., Chicago The house is pleasantly situated in the lot, being set back from the avenue 25 ft., by which means a neat little grass plot is obtained in the front. The foundations are of stone. First story clapboards, second story also covered with clapboards, and the roof covered with shingles, the whole of which is artistically colored, the same being harmoniously blended and giving as a whole a very charming effect. The house is cellared throughout, the basement being covered with a six-inch bed of concrete. The height of this story is 7 ft. in the clear, viz., from floor to ceiling. The first tier of beams are 2 by 12, laid 12 in. center to center, and covered with a rough flooring over which is laid a finished floor of hard wood. The first story is 10 ft. in the clear. Each of the principal rooms has a 12 in. base board, the top member of which runs round the door rim. There is also a plaster cornice, 6 in. deep, to each of these rooms, and a wooden picture mould 18 in. from the plaster cornice. The house is plastered in three coats throughout, hard finish. The staircase is in hard wood with turned balusters and handsome newel, a detail of which is given. The second story is 9 ft. high. There are four rooms in the attic.

The plan of the house is very conveniently arranged, each room filling its respective function with ease and dignity. Architect, P. W. George. Estimated cost $5,000. Our engraving was prepared direct from a photograph of the building taken especially for the Scientific American.

A RESIDENCE AT YONKERS, NEW YORK.

The perspective and plans on page 57 illustrate an attractive residence erected for Mr. F. A. Crandalls, at Yonkers, New York. Dimensions: Front 33 ft., side 56 ft. not including piazza Height of ceilings: First story 10 ft., second story 9 ft. 6 in. The underpinning is built up with "rock-faced" bluestone, and the first story of pressed brick laid in red mortar. The second story is of wood, covered with shingles and painted red, with bottle green trimmings. This house contains fine large rooms, excellent closets, open fireplaces, electric bells, furnace, range, cemented cellar, five rooms in attic and an exquisite manner with tiled hearths and hard wood mantels, carved and provided with plate glass mirrors.

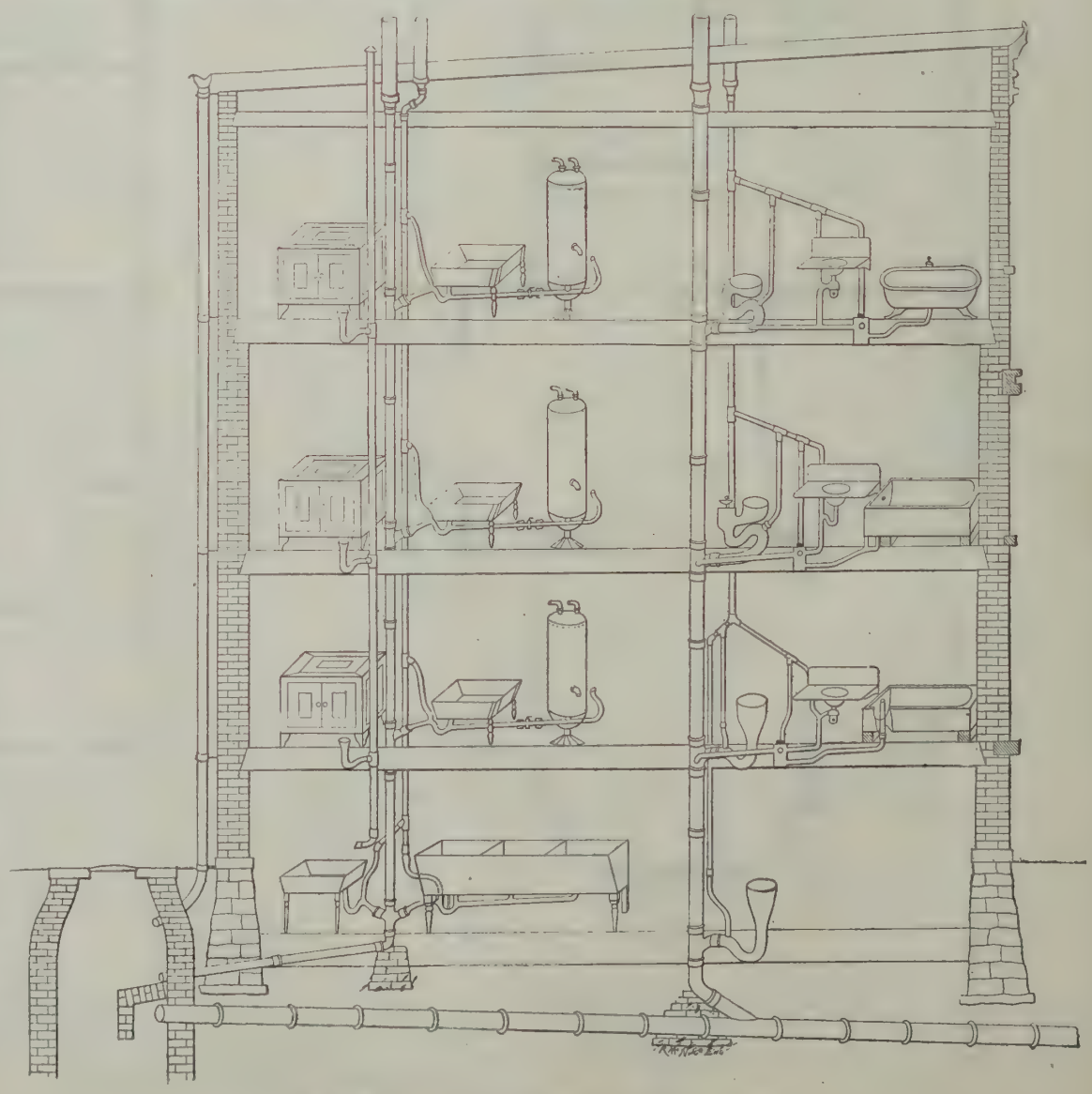
The floors are of hard wood laid in narrow widths. The kitchen, laundry and pantries are wainscoted and fitted up in a first-class manner. There are four bedrooms, den, and bathroom on second floor. The cost $10,325. Kimball & Weisel, architects. Our engraving was made direct from a photograph of the building taken especially for the Scientific American.

A LONG ISLAND COTTAGE.

We illustrate on page 59 a house erected for Mr. G. H. Murray, at Hollis, Long Island. Dimensions: Front, 37 ft.; side, 57 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. Underpinning, brick. First story clapboarded and second story shingled; all painted colonial yellow, with bottle green trimmings. Mansard roof, slated. Hall, parlor, and library are trimmed with whitewood stained and finished in ebony and gilt; dining room is trimmed with similar wood and is finished in cherry. All other interior woodwork and trim is of North Carolina pine finished natural. The staircase in hall has a massive carved newel. Parlor fireplace has a slate hearth and a marble mantel; other fireplaces have tiled hearths and hardwood mantels. Second floor contains four bedrooms, with large closets and fireplaces, also bathroom fitted up complete. There are four bedrooms and storeroom on third floor. Cemented cellar, contains furnace and other apartments. Cost $6,500. Our engraving was made direct from a photograph of the building taken especially for the Scientific American.

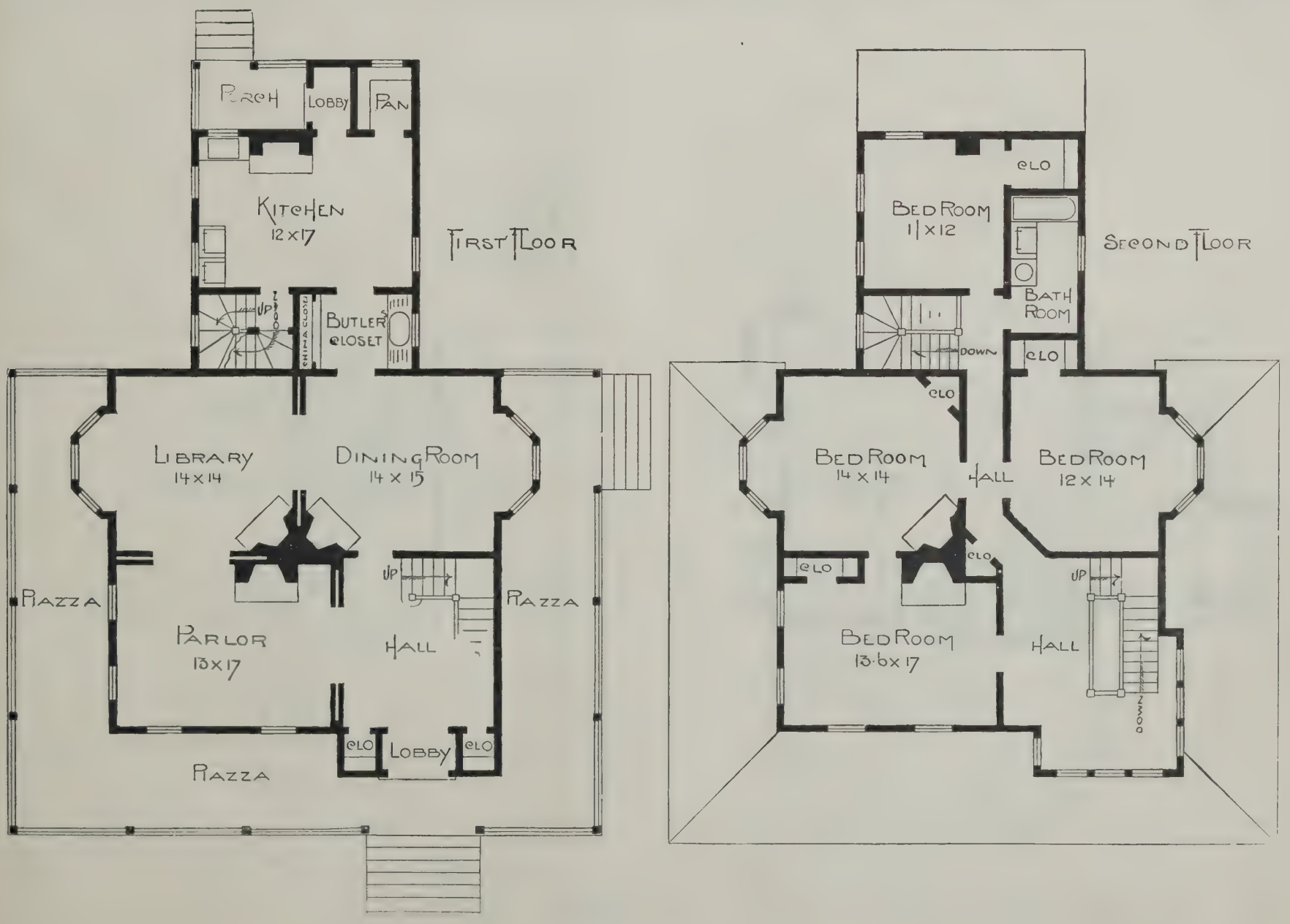
Erslev's Asphalt.

In a suitable metal pot he melts a mixture of coal tar (*Pyroleum lithanthracis*) and resin (*Resina pini flava*) in about the following proportions, viz.: 80 to 90 parts of resin to 20 to 10 parts of coal tar. After the mass is thoroughly melted he mixes therewith 100 parts of pulverized sand or silicious earth or ordinary dry clay (argillaceous earth), or any other suitable finely sifted earth or chalk, in a completely pulverized form, together with 200 to 400 parts of rough gravel. After the whole mass is melted together, it is formed into blocks in a mould, so as to facilitate transport. The asphalt thus prepared is employed in the same way as natural asphalt. It will be found to be absolutely proof against all temperatures, as well as against blows. It will not yield under a heavy pressure or load, and it will not crack under a powerful blow; it will not be affected by hot water, and can be exposed to steam without effecting any change in its condition. Moreover, the artificial asphalt makes better connection with the bed underneath it than natural asphalt, and thus prevents damp and water from lodging between the asphalt and the bed. The connection is, nevertheless, not strong enough to prevent the asphalt from being broken up without destroying the bed. It will withstand the action of acids, and will wear longer than natural asphalt. It is, therefore, evident that it is in every respect superior, as regards quality, to natural asphalt; it is, besides, much cheaper than any known paving material, and is only half the price of natural asphalt.



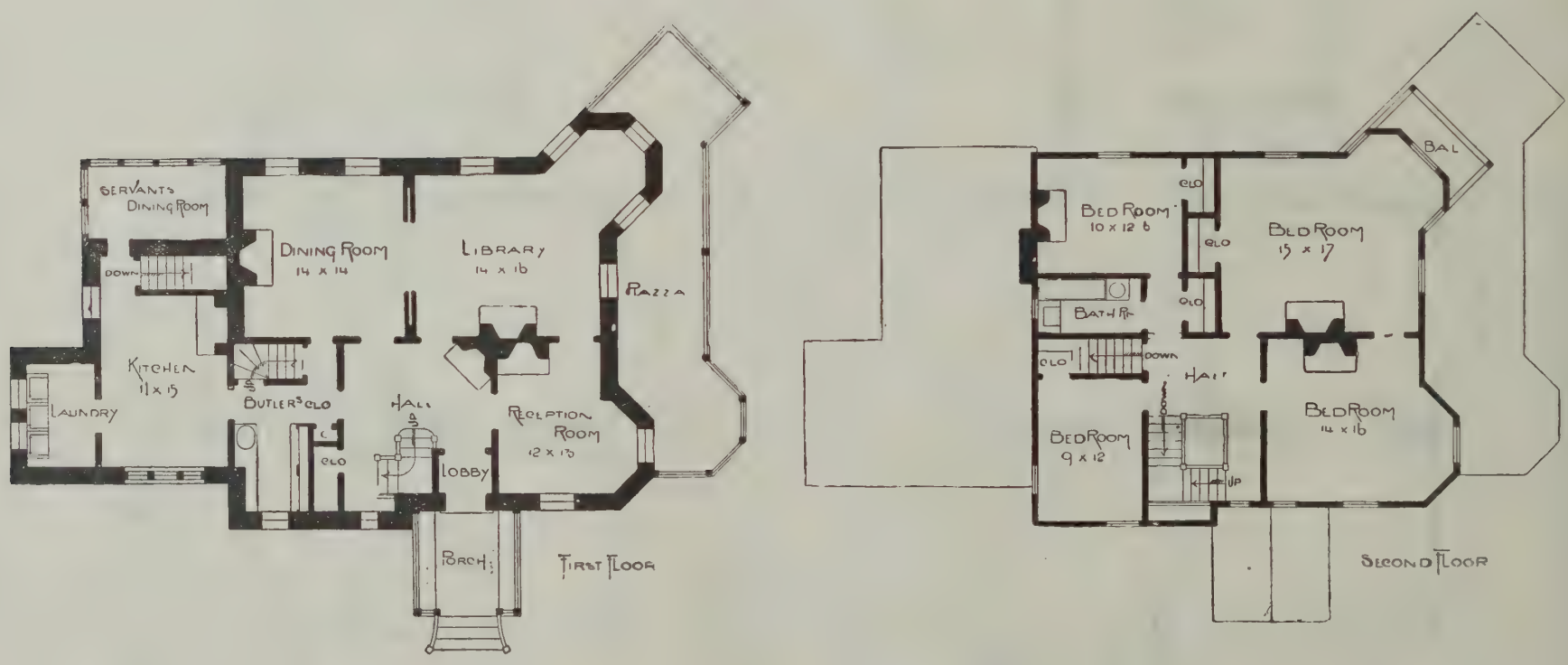
PLUMBING AND DRAINAGE FOR A FLAT.





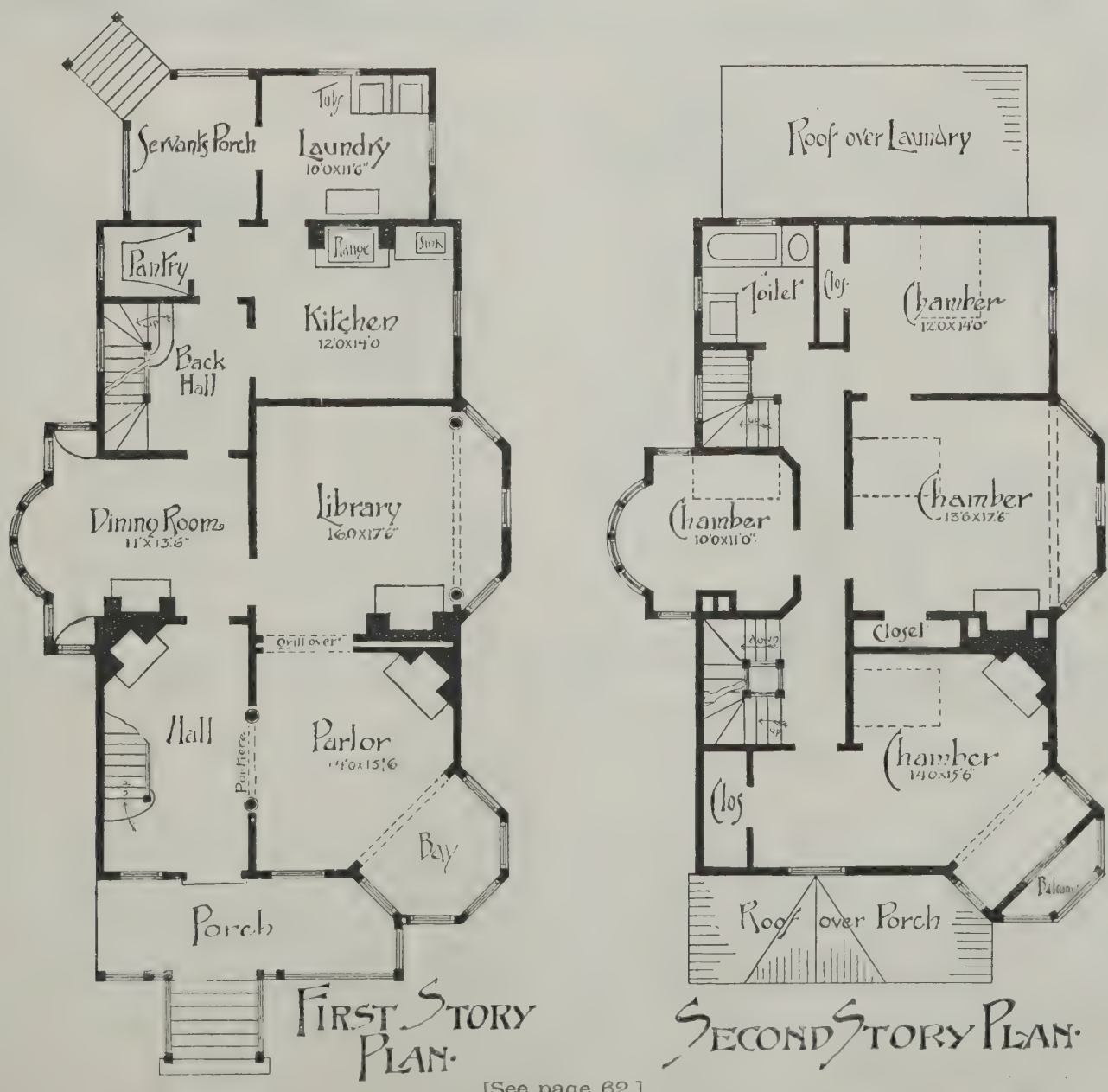
A LONG ISLAND COTTAGE.—[See page 58.]





A SUBURBAN RESIDENCE.—[See page 62.]





FIRST STORY PLAN.

SECOND STORY PLAN.

[See page 62]

A RESIDENCE OF MODERATE COST at CHICAGO, ILL.

DESIGN FOR A CLUB HOUSE.

This design for the new Conservative Club, of Accrington, England, is by Messrs Morley & Woodhouse, architects, of Bradford, England. The *Building News* says:

The building is intended for the central club of the district, and contains billiard rooms, smoke rooms, secretary's rooms, and committee rooms, also rooms for registration of votes, and a large assembly hall to be used for public meetings, balls, receptions, etc. The building will be faced outside with Yorkshire stone. The plans given will sufficiently explain themselves.

A SUBURBAN RESIDENCE.

Our illustration on page 60 represents a residence erected for Mr. Stewart Hartshorne, at Short Hills, New Jersey. Dimensions: Front, 57 ft.; side, 34 ft. 6 in., not including piazza. Height of first story, 9 ft. 6 in.; second story, 9 ft. The elevations are attractive and the plans excellent. First story built of field stone, laid up at random and pointed in red mortar; second story covered with cedar shingles painted a tile red, with bottle green trimming. Roof shingled and painted red. The trim throughout the interior is of whitewood, stained and finished in cherry. Hall contains an ornamental staircase with turned newels, balusters, etc., also a large open fireplace built of brick, with hearth laid with same. Reception room and library have similar fireplaces, with facings and hearths of tiles, and handsome bric-a-brac mantels. Butler's closet contains dressers, closets, bowls, etc. Kitchen, laundry, and servants' dining room are wainscoted and fitted up complete. There are four bedrooms, large closets and bathroom on second floor Fireplaces on this floor are of brick, with brick hearths and hardwood mantels. Four rooms in attic. Cemented cellar is provided with furnace, vegetable and other cellars. Hardwood floors. Cost $10,000 complete. Our engraving was made direct from a photograph of the building taken especially for the Scientific American.

A RESIDENCE OF MODERATE COST.

We publish, on page 61, a perspective and floor plans of a residence, 66 Harvest Street, Chicago; owner, J. F. Olmstead; architect, P. W. George. The house is cellared throughout, the cellar being 7 ft. high. The first story is 10 ft. high, the second story 9 ft. high, and the attic story 8 ft. The house is very conveniently arranged, each room having admirable access to the other. The hall is spacious, and the staircase an open one, with a handsome newel post made out of Spanish mahogany. The balusters are handsomely turned with fine mouldings, and are stained to match the hand rail and newel post. The door trim is plain but effective. The panels in the doors to the main rooms are six-paneled; the bases are 12 in. deep on this floor; 9 in. on the second floor, and 7½ in. on the third. The window trim is the same as the door trim. The plumbing throughout the house is of the finest quality. The house is plastered three coats throughout, hard finish. The exterior is artistically tinted, and has a pleasing effect. The estimated cost is $5,500.

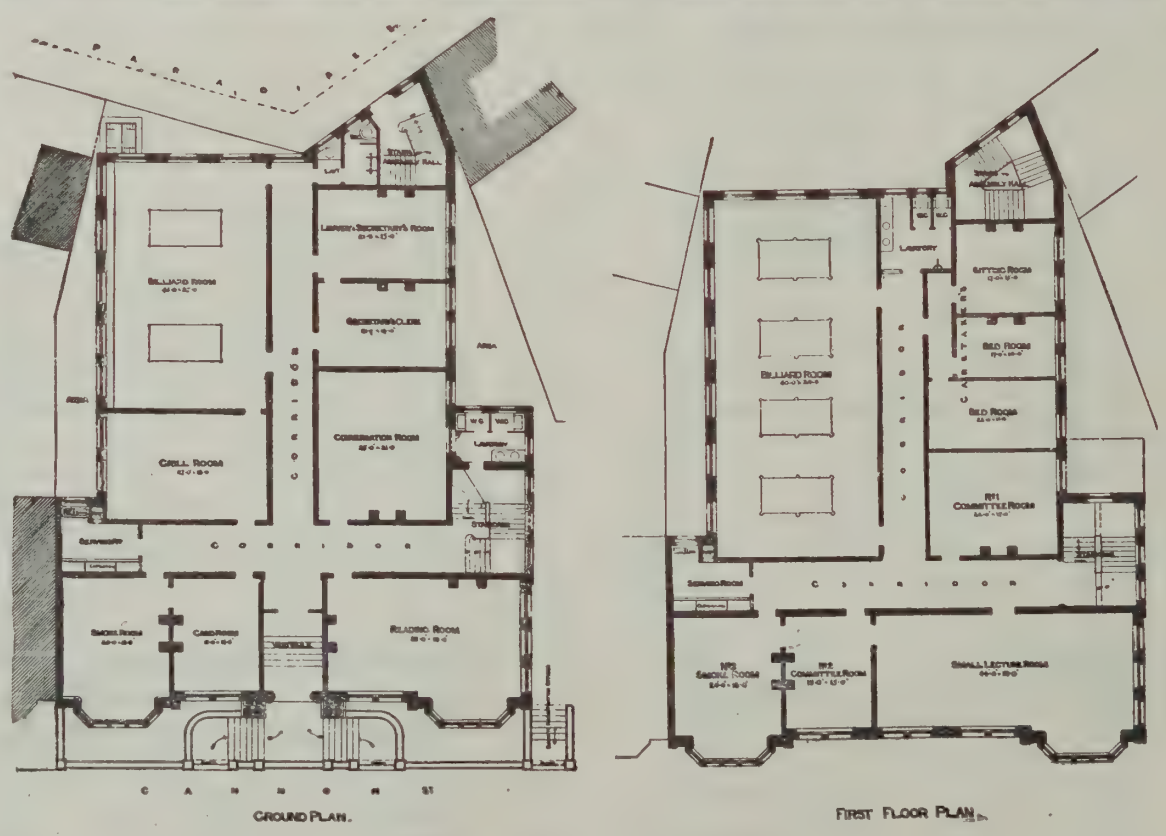
Our engraving was made direct from a photograph of the building especially taken for the Scientific American.

A RESIDENCE AT PORTCHESTER, N. Y.

We illustrate, on page 64, a very handsome residence that has been recently erected for Mr. Frank Mertz, at Portchester, N. Y. The design is excellent, both in arrangement and appearance. The ample piazza and balcony, the attractive hall and staircase, the fireplaces, all are fine features. Dimensions: Front, 37 ft. 6 in.; side, 37 ft. 6 in., not including piazza. Height of ceilings: First story, 10 ft.; second story, 9 ft. 6 in. The underpinning is built of dressed bluestone. The building is sheathed and covered with paper. The first story is clapboarded and painted liver red, with bottle green trimmings. The second story is covered with shingles and painted yellow. The interior throughout is trimmed with antique oak, and is finished in an elegant manner. The door and window casings and the rest of the woodwork is highly polished. The hall is furnished with a grand staircase, massive in appearance and artistic in design. The stained glass windows on staircase and the transoms over windows in dining room shed soft and pleasant light. The floors are of hardwood laid in narrow widths. The ceilings have a heavy moulded cornice. The parlor and dining room are of good size. The butler's pantry and kitchen are wainscoted with narrow beaded stuff, the former replete with shelves, drawers, cupboards, and every convenience. The second floor contains four bed rooms, all well lighted and provided with large closets. There is a bath room wainscoted and furnished with tub, bowl, and closet. One room in attic, besides ample storage room. The fireplaces have tiled hearths and hardwood mantels. The walls throughout the interior are rough-coated and treated with colors. There is a cemented cellar under whole of house, containing laundry and furnace. The house is provided with electric bells, speaking tubes, etc. Estimated cost, $10,000. Mr. Frank Mertz, architect.

Our engraving was made direct from a photograph taken especially for the Scientific American.





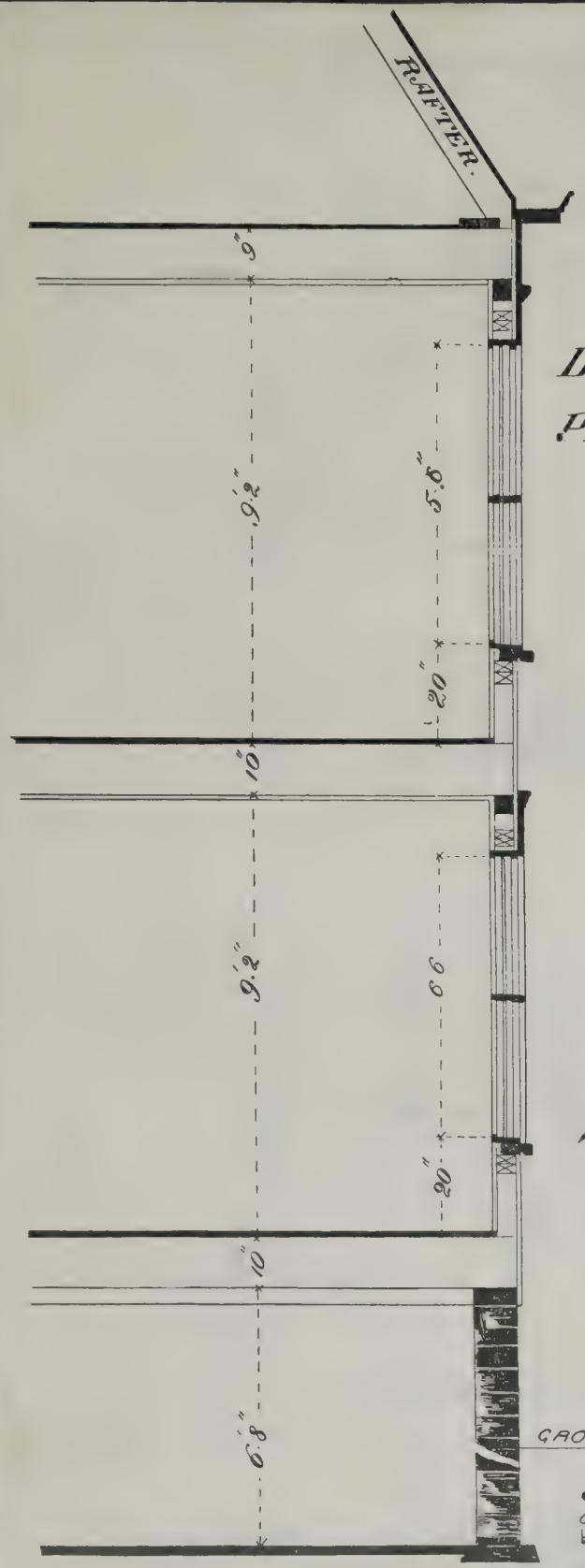
DESIGN FOR A CLUB HOUSE.

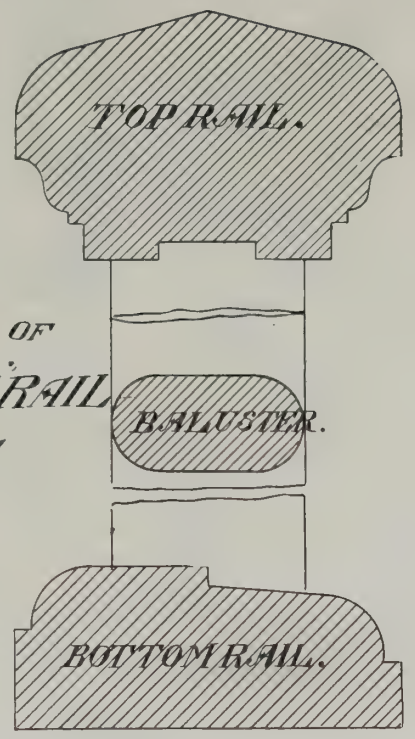
A RESIDENCE ON 176TH STREET, NEW YORK.

We illustrate, on page 65, an attractive residence, that has been erected for Mr. Thomas Hardy on 176th Street, New York City. Dimensions: Front, 31 ft. 6 in.; side, 46 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second story, 9. The foundation is of good building stone, and the underpinning and first story of rock-faced bluestone, pointed in red mortar. The outside walls to kitchen and rest of building are of wood, the framework being sheathed and papered. The kitchen, and that part of the outside partitions around pantry, laundry, etc., are covered with clapboarding, and are painted olive green. The second and third stories are covered with shingles; the second story painted red, and the third story colonial yellow. The roof is shingled, and painted red. The plans show large and well arranged rooms. The interior is handsomely finished, provided with plate glass windows, electric bells, gas, and all the modern improvements. The hall is finished in antique oak, and contains an elegant staircase highly polished. The parlor is finished in mahogany, the library in cherry, and the dining room in ash. The rest of the trim throughout is of whitewood finished in the natural. The kitchen, laundry and pantries are wainscoted with narrow beaded stuff, and are fitted up in a very complete manner. The fireplaces are provided with tile hearths of rich coloring, and hardwood bric-a-brac mantels of exquisite design. There are five bed rooms, bath room, large closets, and linen closet on second floor and four rooms in attic. The bath room is wainscoted in oak. The ceilings are corniced. Mr. Alfred Taylor, of New York City, architect. Cost, $12,000.

Our engraving was made direct from a photograph of the building taken especially for the Scientific American.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., Scientific American office, New York.





DETAIL OF PIAZZA RAIL scale A

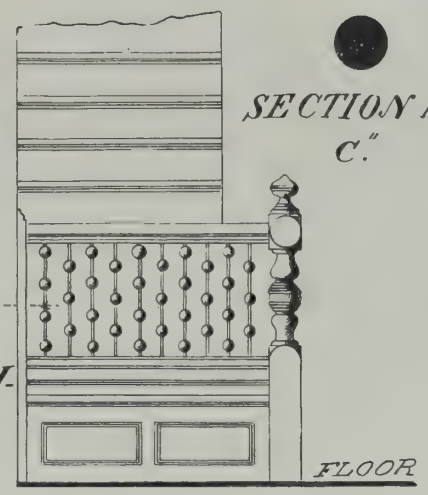


1ST. 2ND C.

1ST AND 2ND STORY WALL BASE. scale A.



STAIR HAND-RAIL scale A.

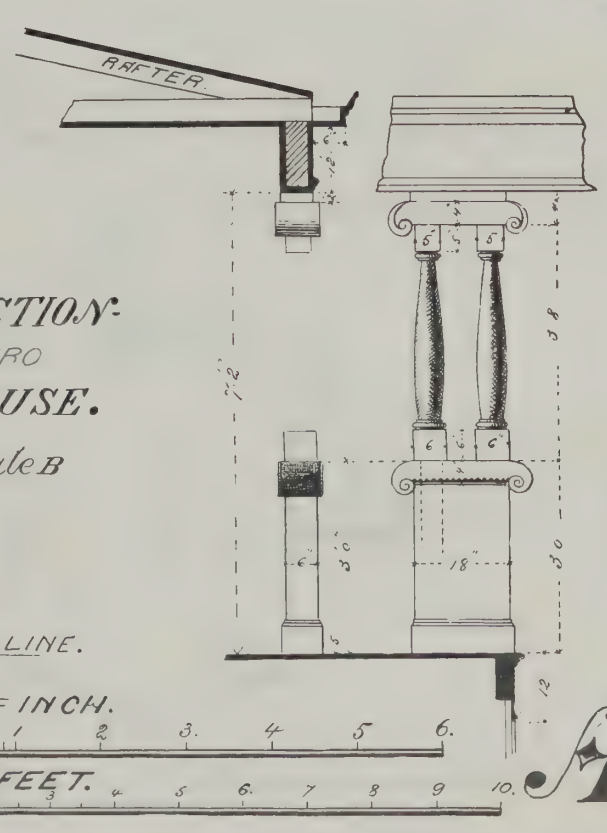


SECTION AT C.



ELEVATION OF TRIM. scale A.

ELEVATION OF STAIR. scale B.



SECTION THRO HOUSE. scale B

GROUND LINE.

A = INCH.

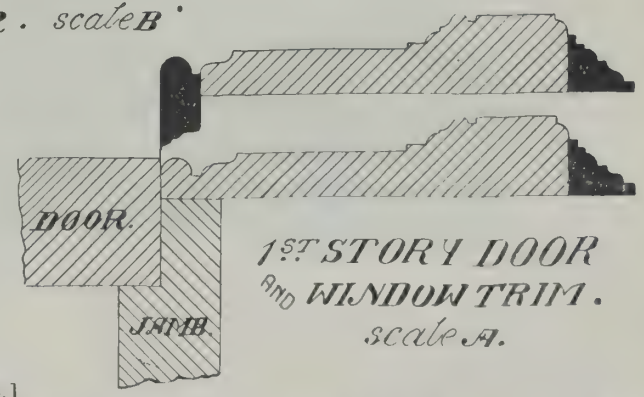
0 1 2 3 4 5 6.

B = FEET.

0 1 2 3 4 5 6 7 8 9 10.



2ND STORY DOOR AND WINDOW TRIM. scale A.

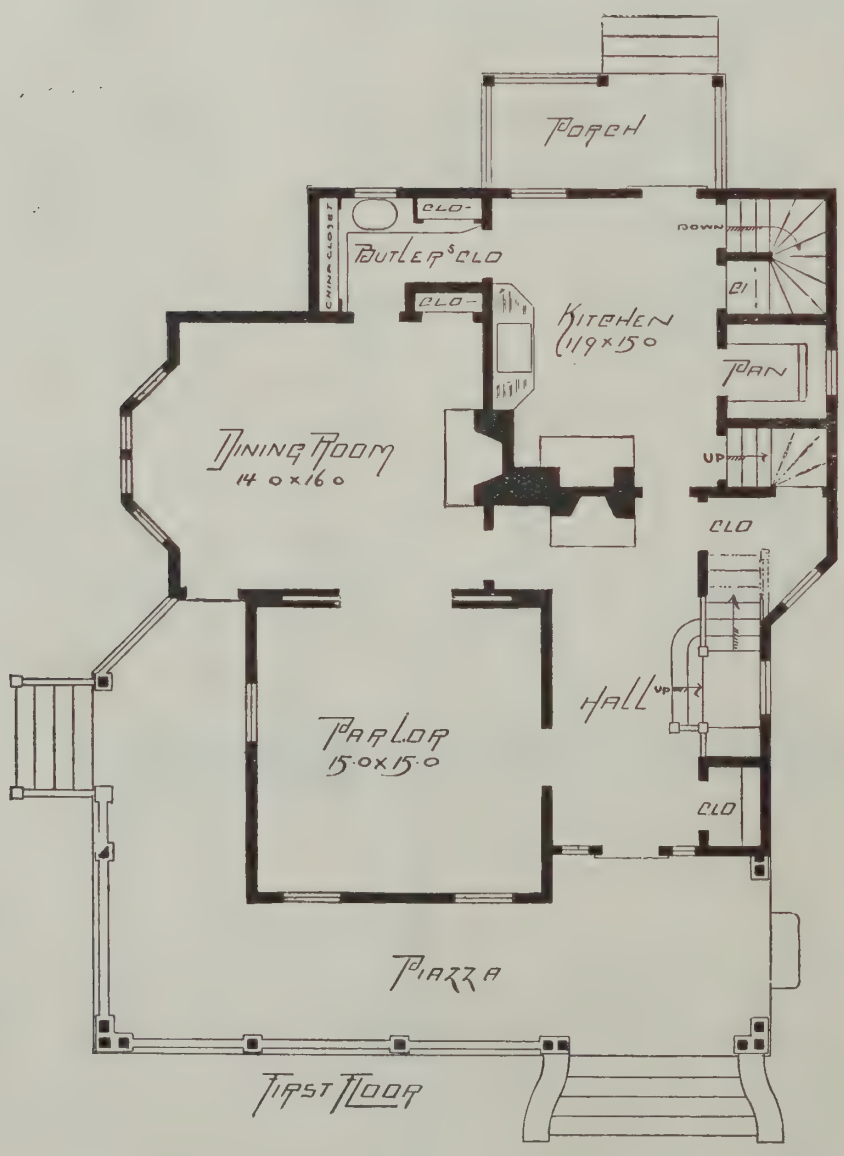


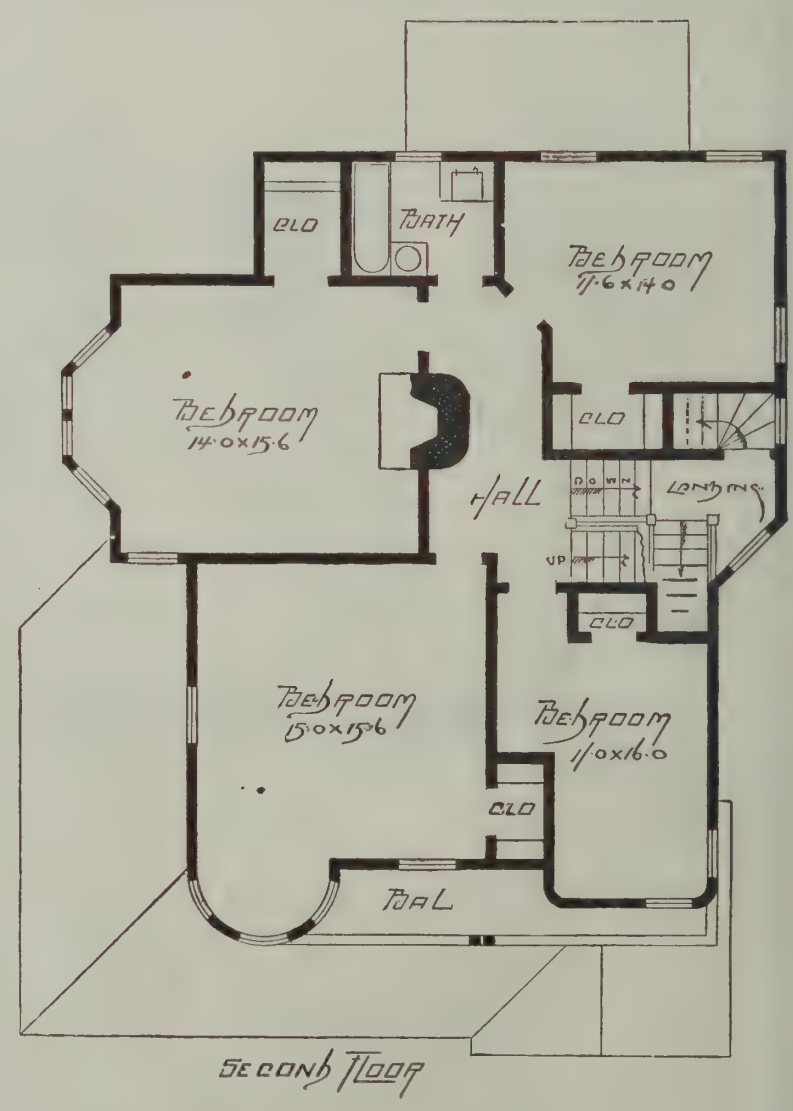
1ST STORY DOOR AND WINDOW TRIM. scale A.

[See page 54.]

A COTTAGE AT MONTCLAIR.

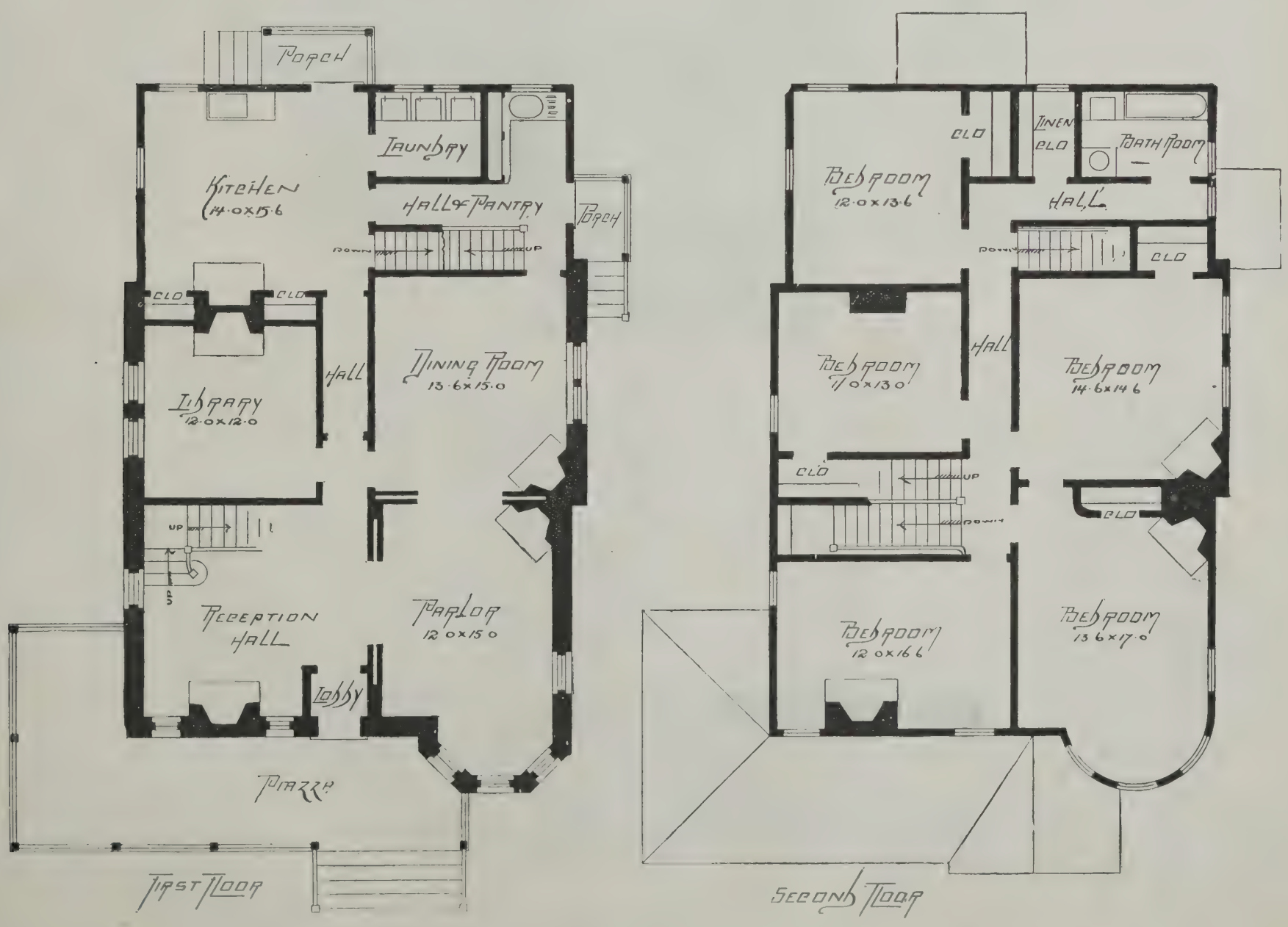






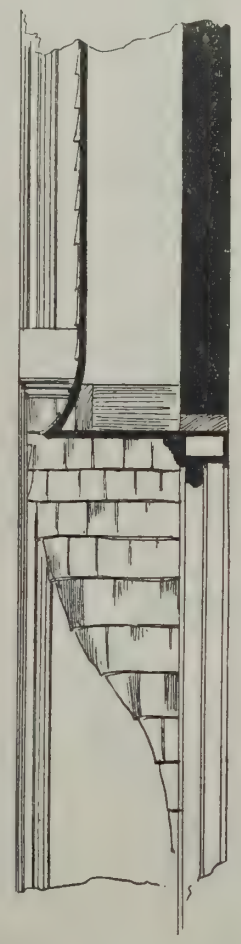
A RESIDENCE AT PORTCHESTER, N. Y.—[See page 62.]





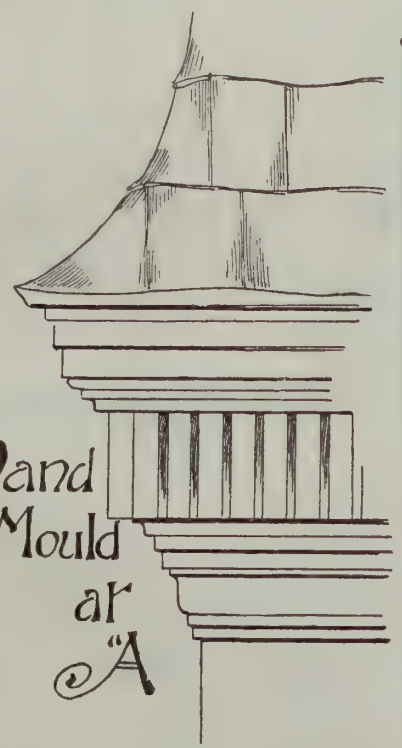
A RESIDENCE ON 176th STREET, NEW YORK.—[See page 62.]

Section of Main Gable



Cornice to the Tower





Band Mould at "A"



"B"

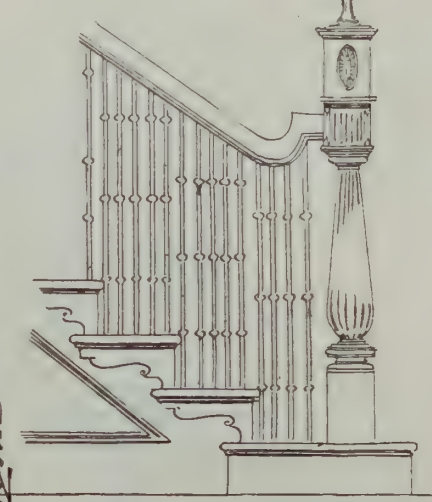
"A"

Section of Gable Board

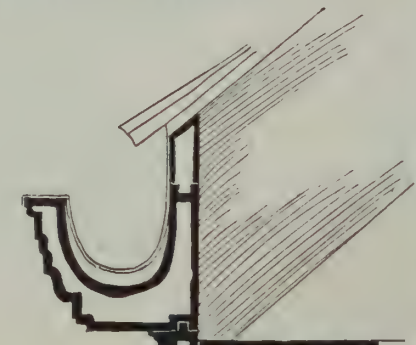


Section Through the Angle Tower

Staircase and Newel Post



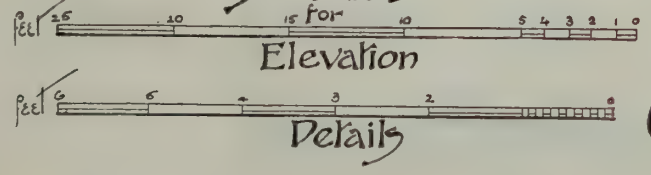
Elevation



Section showing Eaves Gutter

Mould at "B"

Scales



Front Elevation

A LONG ISLAND RESIDENCE

[See page 54.]

A New Idea.

The new buildings of the Egan Company, Cincinnati, Ohio, U. S. A., are fast approaching completion, and in a short time opportunity will be given to bring forward a cherished idea of some years' standing, making a departure original and characteristic of the enterprise of this progressive concern. A new department will be reserved for the displaying of their late improved woodworking machines in practical operation, doing exactly the work they are designed to do. This new idea is an innovation that will be of great value to all those who are interested in getting machines to save time and labor and for doing rapid and perfect work.

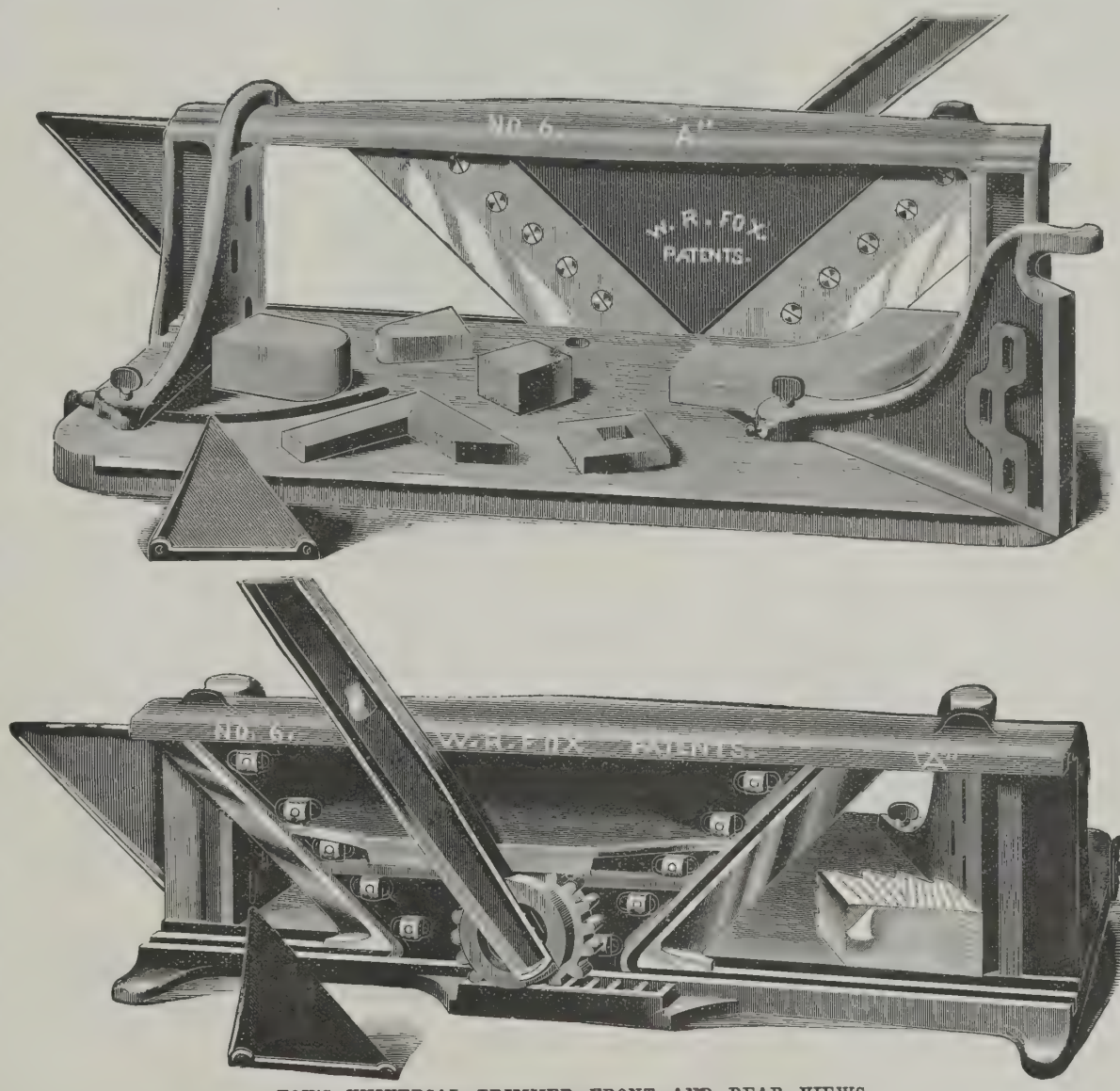
A NEW TRIMMER FOR PATTERN AND CABINET WORK.

We give an engraving of a new machine designed for trimming the ends of wood for miters and joints of all kinds. This machine is being rapidly adopted by pattern and cabinet makers, and is found to effect a very great saving in time, besides producing much better joints than can be made in any other way. It is adjustable, and may be made to work at any desired angle. The knife is obliquely arranged so that it enters and leaves the wood with a shearing cut, thereby avoiding slivering and roughening the corners.

In the construction of this machine the manufacturers take special pains with the knives to get them straight and true and of the required temper. The machine is very rapid in its operation and produces results which cannot be secured by the old methods. No better proof of the utility of this machine is needed than the rapidity of the sales.

We understand that already over 2,400 of these machines have been sold. They are made in four styles, adapting them to all varieties of work. The frame which carries the knives slides in long bearings provided with oiling devices which keep the wearing surfaces constantly lubricated.

Further information regarding this machine may be obtained by addressing The Fox Machine Co , of Grand Rapids, Michigan.



FOX'S UNIVERSAL TRIMMER—FRONT AND REAR VIEWS.

Signor Brentano.

Our readers probably know that Signor Brentano, the young winner of the great competition for the completion of the cathedral of Milan, died recently in Milan, before anything had been done toward the execution of his design. In fact, he had only just begun the construction of a model in wood, intended to afford him better opportunity for studying the effects indicated by his sketches, when he was seized with typhoid fever, which soon proved fatal. Whether his design can be, or will be, carried out, seems now somewhat problematical. According to Signor Melani, who writes on the matter to the *Builder*, Brentano's model is now being completed, in accordance with the designer's drawings, and there would be no great difficulty in keeping closely to the outline and disposition already determined upon, but the cathedral officials have, so far, only the Togni bequest, amounting to about one hundred and seventy thousand dollars, to go toward paying the bills for an undertaking the cost of which is estimated at two millions; and the lack of Brentano's personal influence, with, perhaps, the jealousies which are sure to be excited by the appointment of his successor, may postpone indefinitely the carrying out of the project. By the terms of the Togni bequest, which dates from 1884, the money must be wholly or partly used within twenty years for the work on the cathedral facade, or the gift lapses to another charity, but some way may be found for retaining the sum, which is, after all, not large in proportion to the whole amount necessary. Personally, as Signor Melani writes, Brentano was a man of very modest disposition, irreproachable in character, and accustomed rather to the life of a fastidious and well bred young man of rank than to that of a professional artist. Notwithstanding his elegant and luxurious tastes, however, he was a devoted student. Even while a pupil at the Polytechnic School at Milan, he gained much credit by his sketches of architectural subjects; and when, much to his own surprise, he was selected to be one of the participants in the second competition for the cathedral facade, instead of imagining himself to be the greatest artist living, he went immediately to Germany to study Gothic architecture to the best advantage, and after examining the best original examples, entered the office of Baron Hasenauer, the celebrated architect of the Museum of Fine Arts and many other buildings at Vienna, where he remained for several months, for the sake of gaining a knowledge of the principles of Gothic work from so competent a master. All this well directed work bore fruit, and his final design immediately received the votes of twelve out of the fourteen judges. The excitement and anxiety of the contest appear to have been too much for a constitution naturally delicate, and his friends have for some time been dreading an event which has made the winner of the competition the fourth of the competitors, under thirty years of age, who has died since the first sketches were submitted. The first was the lamented Ciaghin, of Saint Petersburg, who was selected for the second competition, but did not live to finish his plans. The next was Tabea, of Venice, a man of great ability, and the third was Raffaele Cattaneo, who will be remembered as one of the architects engaged upon Ongania's splendid publication on the church of St. Mark at Venice.—*Amer. Architect.*

Concrete in France and Italy.

Some substances, such as pozzuolana—a volcanic production found chiefly in Italy—have, in consequence, apparently, of silicate of alumina being predominant in their composition, the property of giving hydraulic qualities to the rich or non-hydraulic limes. It is of these that the concrete is made which has long been used for marine works on the shores of the Mediterranean, and, indeed, the piers at some of the Italian ports have been constructed almost entirely of hydraulic concrete.

The author had lately an opportunity of examining, at Genoa, the extension of one of the moles of the harbor, the inner side of which has a vertical wall. The latter was in process of being constructed under water entirely of pozzuolana concrete, simply thrown into the sea from baskets carried on men's heads, a hoarding confining it to the shape of the wall. In a short period it set quite hard, so as to enable the upper part of the wall, which is of stone, to be built upon it. The outer side of the mole, which had been previously made, was formed by stones deposited "*a pierre perdue.*" Though the depth of the quay wall was not great, this shows the confidence which the Italian engineers have in concrete applied under water in a soft state.

The piers of the new basin constructed by the Austrian government at Pola, in Istria, are also formed, in a similar manner, of concrete confined between rows of timber piling. But perhaps the most striking application on a large scale of pozzuolana concrete is in the great mole which protects the port of Algiers.

To form the mole, blocks of beton of immense size, so as to be immovable by the force of the sea, were employed. Some of these were formed *in situ*, by pouring the concrete into large timber cases without bottoms, sunk in the sea in the line of the mole. Other blocks of a smaller size, though upward of thirty tons in weight, were made on shore, being moulded in strong wooden boxes. After the beton had set, the boxes were removed, and the blocks were launched into the sea to find their own level. The beton for the blocks *in situ* was composed of one part of rich lime in paste, two parts of pozzuolana, and four parts of broken stone. That for the blocks made on shore was formed of one part of lime in paste, one part of pozzuolana, one part of sand, and three parts of broken stone. These blocks set sufficiently hard in twenty-four hours to resist the shocks of heavy seas, and the mole now stands firmly, instead of being, as it was when formed of loose blocks of stone in the time of the Moors, nearly destroyed every winter.

The French engineers have shown great boldness and skill in the application of beton, as exemplified in the Pont de l'Alma over the Seine, the arches of which, as well as the piers, are formed of rubble concrete; in the new graving dock at Toulon, before alluded to; and in the formation or protection of breakwaters by enormous artificial blocks of beton, as carried out at Marseilles, Cherbourg, La Ciotat, Cette, Vendres, Cassis, and Algiers.

A short time ago, when the author inspected the mole or breakwater which incloses the harbor of Marseilles, he found the huge rectangular concrete blocks, weighing upward of twenty tons each, by which its seaward side is protected on the "*pierre perdue*" principle, perfectly entire and sharp in their outline, though they had been exposed for many years to the action of the sea. Any one standing upon that mole, and witnessing in a gale the heavy seas breaking with tremendous force on these concrete masses and recoiling harmlessly, could have no doubt as to the efficiency of concrete as a constructive material.

Hydraulic concrete, to be effective, requires care and attention in its manipulation, and in the regulation of the proper proportions of its materials. Any failures must have arisen from inattention to these or similar points, as there is ample experience to show that, when properly made, every confidence may be placed in its strength and durability. Even where stone is abundant this material may be often employed with economy and advantage, but where stone cannot be obtained, the importance of being able to form an effective substitute out of materials of so little value, and so widely distributed, can hardly be overrated.—*T. Martin.*

A New Plan to Supply Chicago with Water.

Dr. Leon Lewis, of Chicago, proposes the construction of a pipe line from Lake Superior, near Marquette, through Michigan, along the western coast of Lake Michigan, to Chicago. In this way, he claims, the problem of a pure water supply can be solved. The lower end of Lake Michigan he regards as little better than a pond of still water made impure by the discharge of the sewage of the neighboring territory. Three hundred and thirty miles is the distance to be covered, and this the enterprising projector does not consider at all insuperable.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.

Lignomur.

The American Decorative Company, 116 Pearl St., Boston, Mass., have issued six new patterns of their patent wood fiber material for interior decoration, which they aptly term "Lignomur." One of these patterns, a sample of which has been sent to this office, is a very bold frieze in the popular colonial style, consisting of a garland of flowers suspended from rosettes, and set off by floating fillets and conventional foliage. Festoons of pearls and an ornate tassel relieve the lower part of the design. Another handsome and very useful pattern is a two-band frieze in basket work and a heavy braid. The other patterns are designed for hangings and fillers, and are not specially striking, though neat and tasteful. This material, being pure wood fiber, is easily and effectively treated the same as natural timber, and in this treatment is being extensively used for the interior finish of railway coaches by the Boston & Albany R.R. and other car builders, in addition to the original purpose of Lignomur as a wall and ceiling decoration for houses.

New Gasoline Engine.

The Van Duzen Gas and Gasoline Engine Co. has been experimenting upon gasoline engines during the past year, and has perfected a remarkable engine. We are informed that a 6 × 7 inch engine, weighing only 800 pounds, and taking up about as much room on the floor as a flour barrel, is running 100 feet of shafting and machinery necessary to keep twenty machinists at work.

This engine consumes about six gallons of gasoline daily, at an expense of sixty cents. We understand that these engines are being furnished at very reasonable prices.

The Van Duzen Gas and Gasoline Engine Co., Cincinnati, Ohio, the patentees and manufacturers, will give any desired information regarding these engines. We call attention to the change in the advertisement of this company.

Architectural Iron Works.

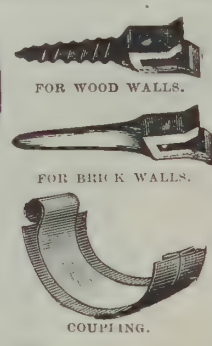
The Muncie Architectural Iron Works, of Muncie, Ind., have recently established a branch house at 86 La Salle Street, Chicago, Ill., under the management of Mr. R. N. Mason.

We are pleased to note this evidence of progress and deserved success.

STANDARD EXPANDING WATER CONDUCTORS, EAVES TROUGHS, ETC.

The accompanying illustrations represent a system of water conductors for all kinds of buildings which has received the warm indorsement of architects and builders. They are manufactured by Messrs. Armor, Marlin & Co., of Allegheny City, Pa. The conductors are made of soft sheet steel, galvanized, in lengths of 7 ft. each, and without any soldered cross seam. The conductor is made with a longitudinal fold which provides for expansion and permits the fastener in the wall to be attached at any point. The fasteners keep the conductors from touching the walls, and are so made as to allow the fold of the conductor to expand in case of water freezing in it. The illustrations show the fasteners as made for brick or wood walls, each fastener being made with curved jaws, which present an opening to receive the fold of the conductor. These conductors are made in round, pentagon, hexagon, heptagon, and octagon patterns, and expanding elbows and shoes are also made in similar patterns therefor. The eaves troughs are made in 8 ft. lengths, of galvanized sheet steel, and with detachable couplings, which make a strong and perfectly watertight joint, without either solder or rivets. The same firm also make ridge rolls of galvanized sheet steel, and furnish the same in imitation of terra cotta or other styles.

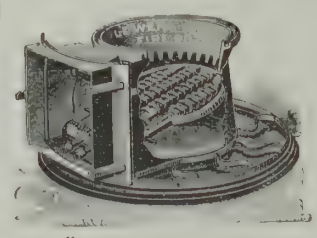




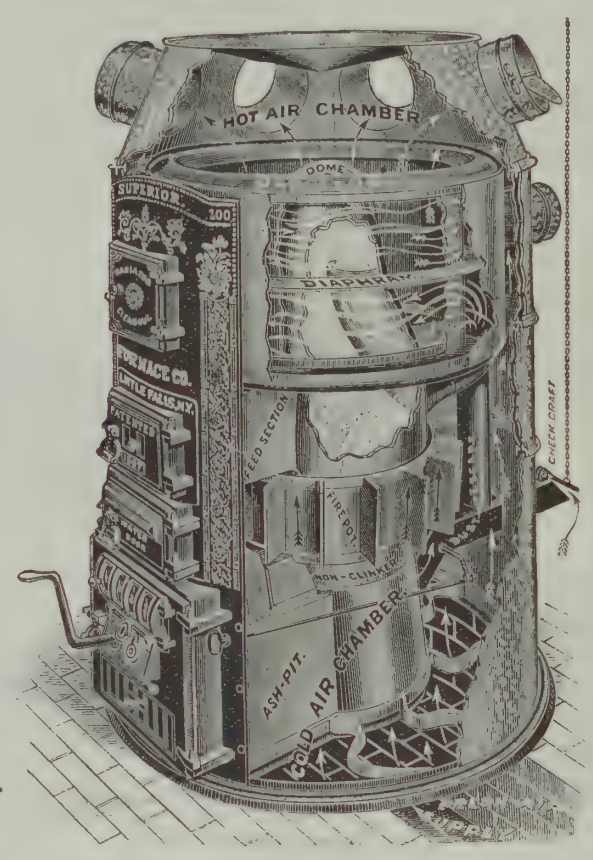
STANDARD EXPANDING WATER CONDUCTORS, EAVES TROUGHS, ETC.

A HIGHLY IMPROVED HEATING APPARATUS.

The illustrations represent the main features of construction and some recent improvements in the well known hot air furnaces manufactured by the Superior Furnace Co., of Little Falls, N. Y., and adapted to warming residences, churches, educational institutions, hotels, etc. This furnace has a cast iron dome in one section, extra heavy, of such form that the expansion and contraction do not affect the connected cup joint at the fire pot. The dome projects in a conical form into the hot air chamber, and is fitted internally with a diving flue, forcing the products of combustion to circulate inside to the top of the dome before entering the radiator at the rear of the furnace. The radiator is mounted with No. 12 gauge cold-rolled Bessemer steel plate, twenty inches high, and has adjusted horizontally through its center a diaphragm with an opening at the front of the radiator, which necessitates the circulation of the burning flame and gases twice around the radiator before entering the smoke exit. This feature having been tested during the past three winters, is said to have proved a phenomenal success, and to effect a remarkable saving in fuel. The large air space between the dome and radiator permits of a free admission of fresh air. There is a combination check draught with chain attachment from first floor and dust escape at rear of furnace, the check being absolute and positive, and readily operated from the living rooms. The bottoms are cast unusually strong and heavy, and have a three-inch depression in the center to permit of an extra deep ash pit, and prevent the burning out of the grate. The grate bars are adjusted in a portable frame so supported in the ash pit that by drawing forward the dog that supports the grate frame in front, its contents can be easily dumped when desired. A right and left hand shaker bar is employed. All of these furnaces are fitted with ornamental solid cast iron fronts, handsomely japanned and gilded, and the doors are all adjusted on the front of the furnace and hung with solid bronze metal hinge pins. No bolted joints are used in this construction.



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The Secret of Cheap Building.

A man who is resolved to be independent of landlords can build a very comfortable house for from $2,000 to $2,500. He can have sufficient room, and a house with a decent exterior and a plain interior. He ought, first and foremost, to provide a bath room, even if he cannot buy a slate mantel. It will be the wisest in the long run to have a bath room. Ask any woman who has had the care of two or three children how much a bath room saves them. The larger the family, the greater the saving in work and worry, which is more wearing than work. If a man has only $2 000 and a large family, he must sacrifice something or deny himself something when he builds.

If he is wise, he will contrive closets and cupboards, a style of house that renders running up and down stairs unnecessary (there is nothing so tiresome as going up and down stairs), make his dining room large enough for a living room, and see that the arrangement of the kitchen is labor saving. Slate roof, slate mantels, bay windows and pretty trimmings can all be dispensed with. There are people who do not seem to have any clear idea of the things that are appropriate in a cheap house. We recall an instance where a gentleman, after looking at a design for a cheap house, expressed surprise at the cost, which was very low, and in the same breath he inquired if the house would be roofed with slate. A cheap house is not roofed with slate, it is useless to add. His next query had reference to the plumbing. If his ideas were realized, the plumber would charge at least three hundred dollars. Evidently, the gentleman thought the plumbing would cost about a third of that sum, or less.

To sum it all up, substantial fixtures rather than pretty trimmings. Good ventilation, ample room, plenty of light and warmth, may be obtained, if a man desires to insure it in building for his own use, at a very moderate outlay. But then he must build to please himself instead of vying with his neighbor.—*Real Estate Record.*

No better recommendation of an article is needed than repeated orders for the same goods from the same quarter. The Crossmon House, at Thousand Islands, Alexandria Bay, N. Y., has been heretofore painted with the asbestos paint made by the H. W. Johns Mfg. Co., New York. By making a new and unsolicited order for 150 gallons of this paint for application to their house this fall, the owners, Messrs. C. Crossmon & Son, are giving a most substantial indorsement of this brand of paint.

THE new and extensive building of the West Texas Hospital for the Insane, which has just been finished at Terrall, Texas, is furnished with a roofing covered with Terne plates of excellent quality, known as the "Pennsyl Old Method" brand, sold by Gummey, Spering & Co., Philadelphia, Pa. The West Tennessee Hospital for the Insane, at Bolivar, Tenn., and many other large buildings throughout the country are roofed with these plates, which have borne the test of time and hard usage, and stand as a testimonial of their own good qualities. The firm have also another brand of Terne plate known as the "Alderly." This plate is made of Siemens-Martin soft steel of standard weight, perfectly square and well assorted. These two brands of roofing plates are highly indorsed by a long list of responsible roofers and builders.

GEOMETRICAL WOOD CARVING.

Geometrical wood carving is an industry that is being carried forward with great success at Allegheny City, Pa., by the Geometrical Wood Carving Co. The products of this factory are designed for ornamental wainscotings, ceilings, casings, mouldings, and for articles of furniture generally.

The machine by which the carving is done is the invention of Dr. C. L. Goehring. We illustrate herewith a piece of work turned out by this establishment for the Pittsburg *Commercial Gazette.* It is a counter made wholly of oak and elaborately carved by Dr. Goehring's machine. The entire office is finished in this manner. We are informed that to do this work by hand would be practically impossible, as there is, at a low estimate, over twenty years' hand work for one man in this counter.

We are informed that this novel carving is attracting a great deal of attention from architects and builders in all parts of the country.

The offices of the Geometrical Wood Carving Co. are located at 708 Penn Avenue, Pittsburg, Pa. Dr. C. L. Goehring is president, and Mr. W. H. R. Hilliard the secretary of the company.



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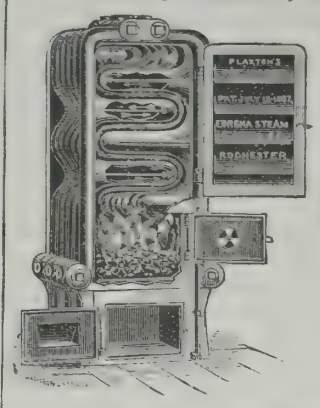
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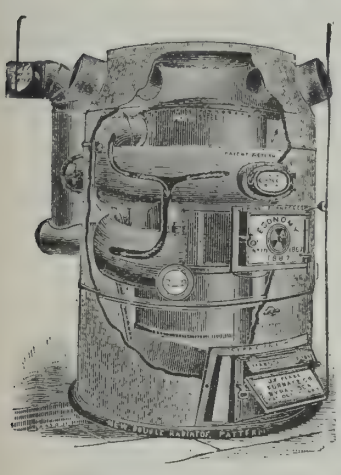
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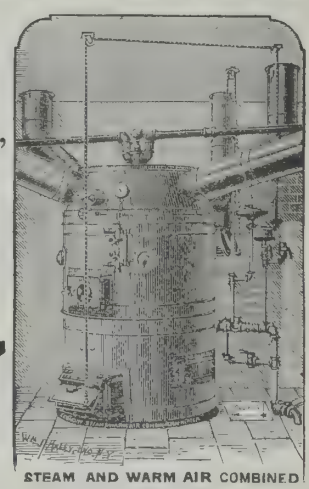
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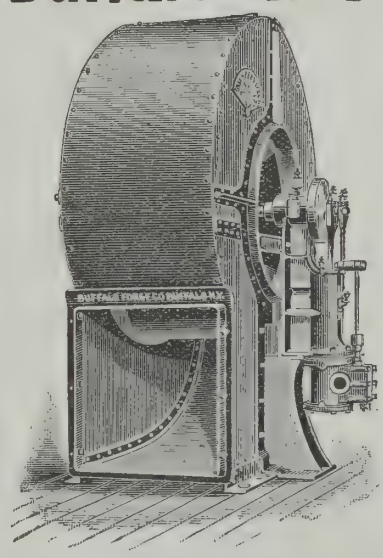
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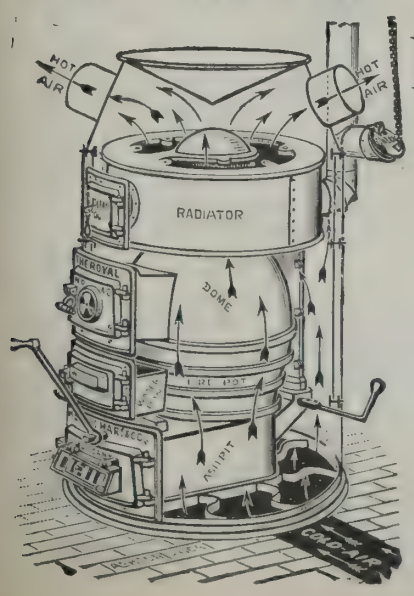
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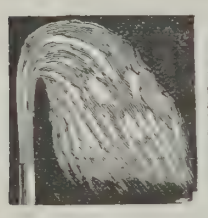
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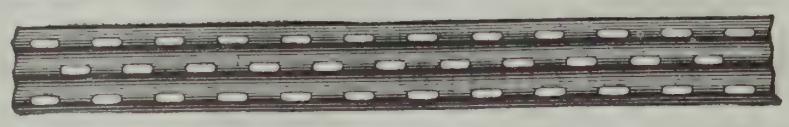
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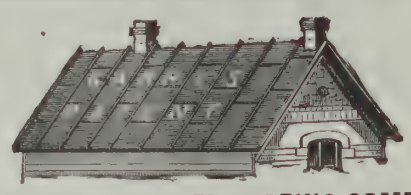
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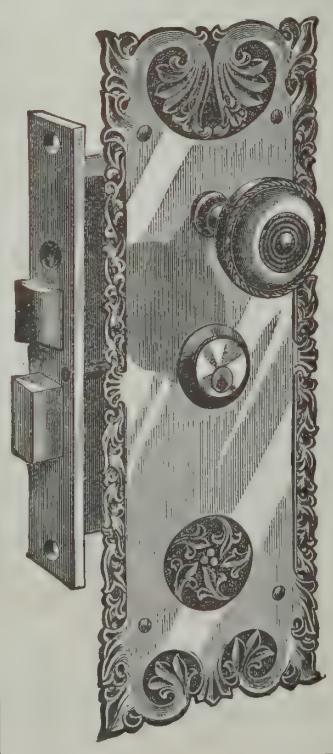
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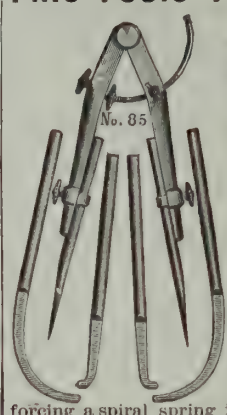
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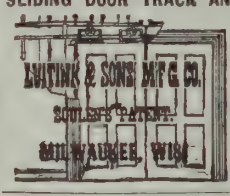
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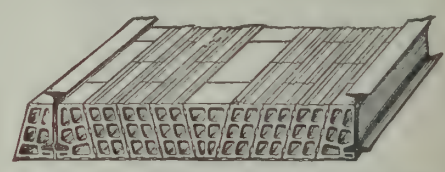
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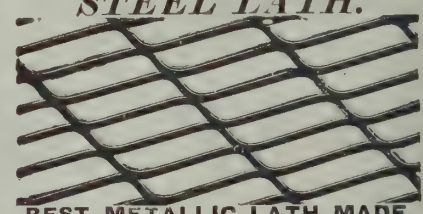
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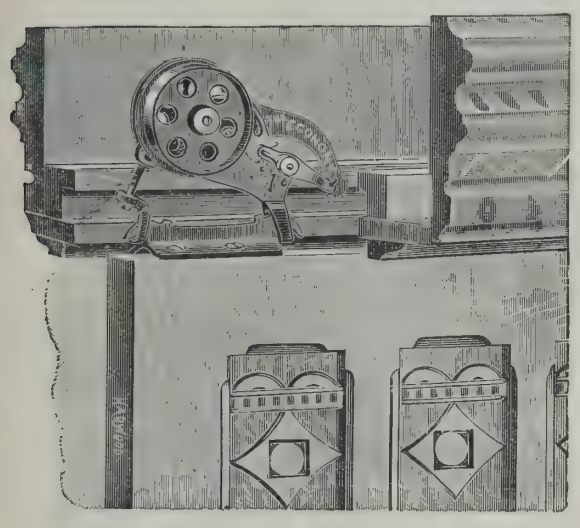
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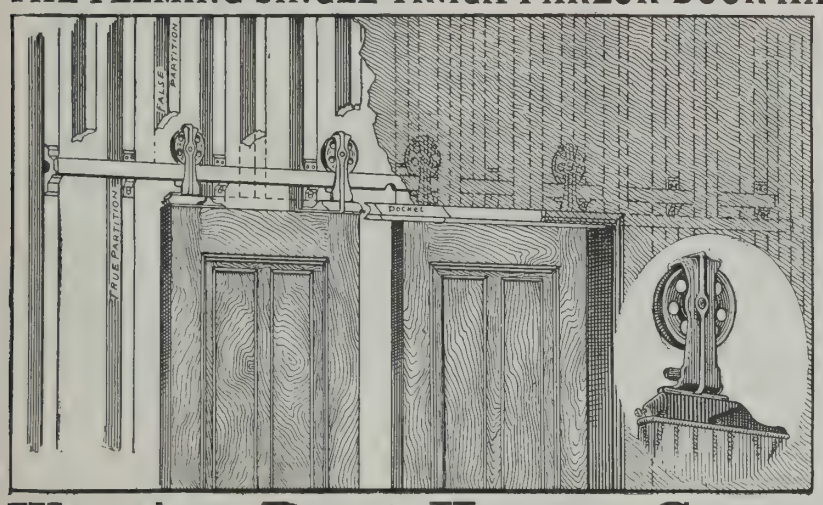
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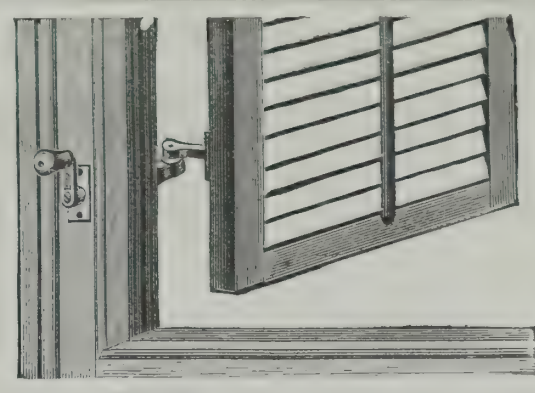
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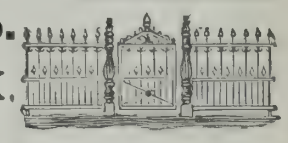
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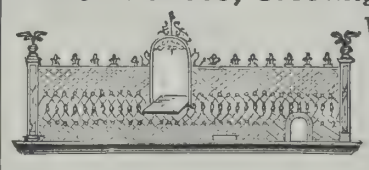
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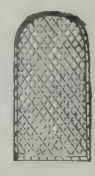




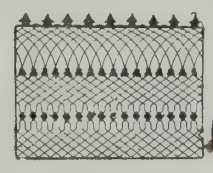
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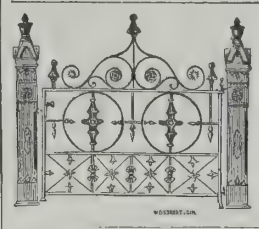
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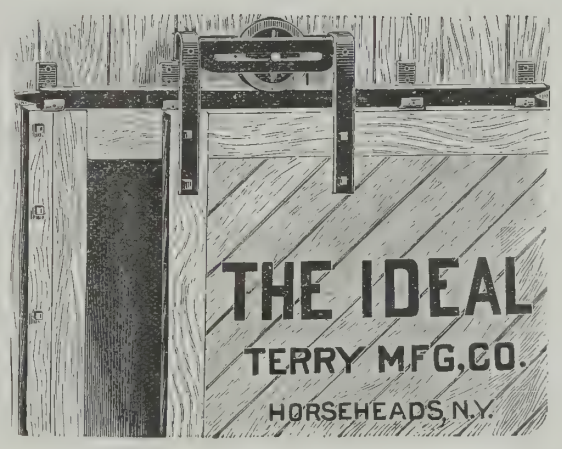
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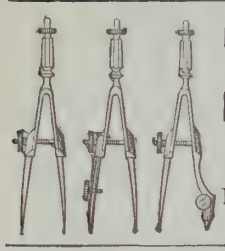
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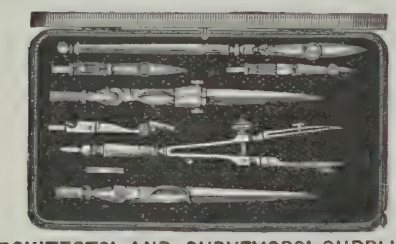
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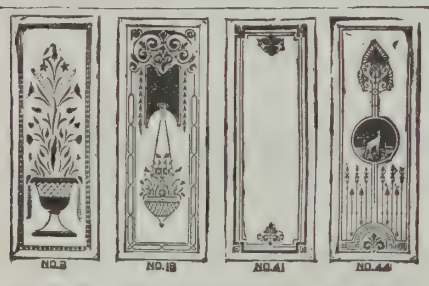
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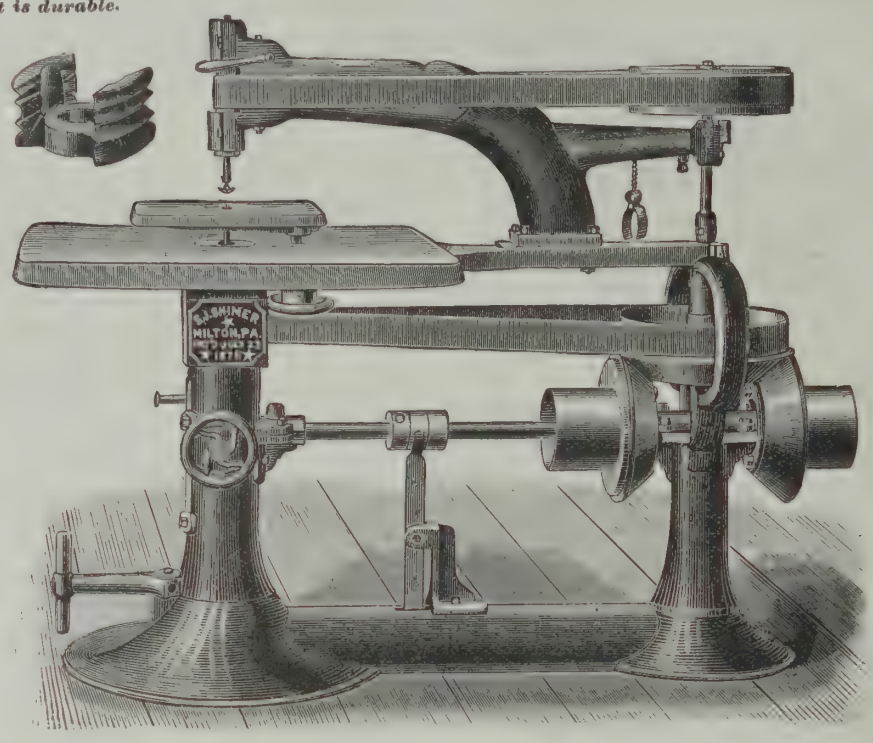


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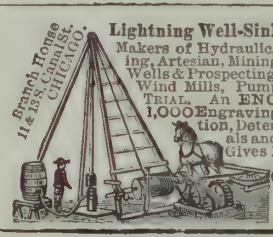
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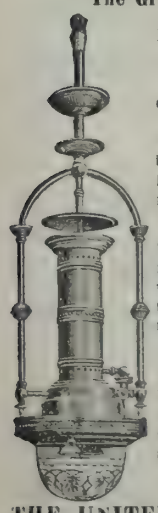
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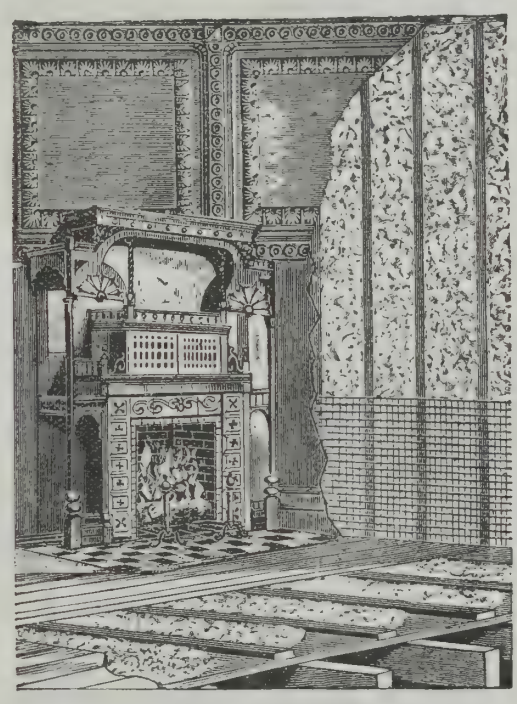
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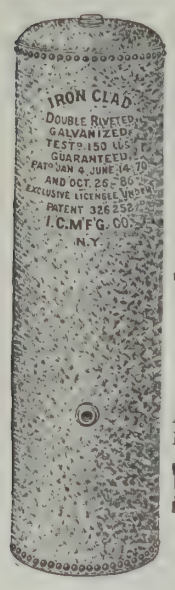
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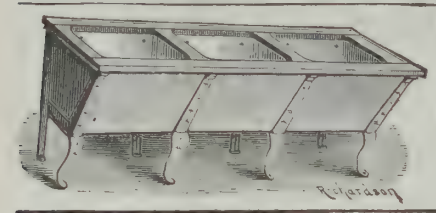
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(2) H. M. writes: Can you tell me what causes sweat or emitting moisture on a looking glass when exposed to sudden change of atmosphere, likewise metal vessels? Do you know any preventives? A. The trouble you refer to is due to condensation of the moisture of the air. One preventive is to rub a little glycerine over the surface, and this is not permanent, and the remedy may be worse than the original trouble.

(3) H. D. asks (1) for a remedy for ants in a pantry. Of course, nothing dangerous to man will answer. A. Try buhach or erythrum. See our SUPPLEMENT, No. 247. 2. A receipt for rubber stamp ink, both colors and indelible. Have tried various formulas published, but all lack proper body and staying qualities when applied to the pad. The indelible inks sold and made from various formulas come out in one or two washings at laundry, though they last some months in the home wash. A. Rubber stamp ink is made from aniline colors and glycerine. As an indelible ink the best printer's ink is to be recommended. 3. How do the collar manufacturers stamp their goods so that their trade mark can never be washed out? A. We presume it is with printer's ink.

(4) J. A. B. asks (1) how to make a good silicate of soda paint, such as backgrounds are painted with, and how the different shades are obtained. A. Dilute silicate of soda solution until it works well with the brush, and add dry coloring matter, such as will not be decomposed by the chemical. Ochers, Venetian red, smalts, umbers, and siennas may be employed. 2. How to frost the glass in my skylight. A. Rub over with a little bag of muslin filled with fine sand, powdered glass, or grindstone grit and water. Some sand may be placed directly on the glass. 3. A good water and acid proof coating for wooden trays. A. 4 parts resin, 1 part gutta percha, and a little boiled oil melted together. 4. How to make a good liquid glue. A. To ordinary glue melted with as little water as possible add enough acetic acid to reduce to proper consistency.

(5) H. L. H. writes: I want to make good glossy red paint to dry quick. How can I get it? I have been using Chinese vermilion and gum arabic water. A. Dissolve the best red sealing wax in strong alcohol. Or simply make a strong solution of shellac in alcohol and stir in enough of Chinese vermilion to give a good color and body.

(6) F. W. F. asks (1) what the best method is for covering heavy muslin to make it waterproof for a tent. A. Use paraffine wax melted in with a hot iron. 2. How the starch is fixed that they use in laundries to get the right gloss. A. Principally by heavy polishing irons or their equivalent. A little paraffine wax may be added to the hot starch. 3. What are the best acids to use for engraving names on steel? A. Sulphuric or nitric acid diluted with three to five volumes of water.

(7) F. & T. Manufacturing Co. write: We have been using benzine as a cleaner by having a dish of it large enough to dip a machine in, but owing to the danger from explosion and fire we are very desirous of using something else, and would like to know if you know of anything to take its place. A. We cannot suggest any substitute. Strong ammonia is recommended as an extinguisher of oil fires, and might be kept on hand in glass-stoppered bottles to be used as fire grenades in case of trouble

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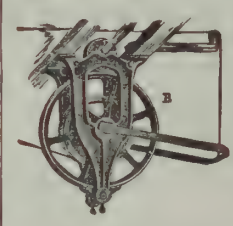
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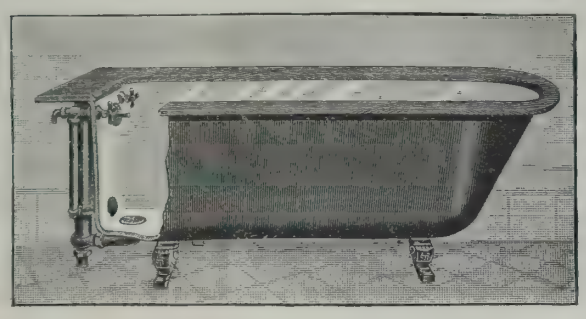


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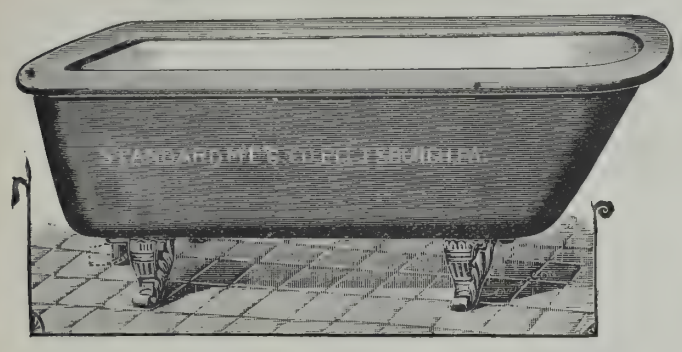
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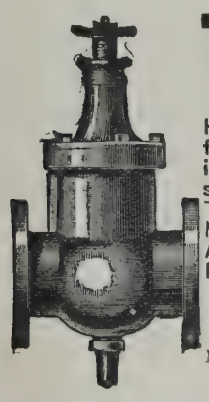
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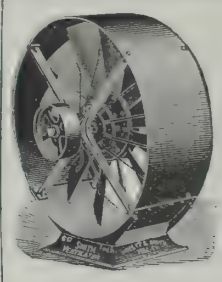
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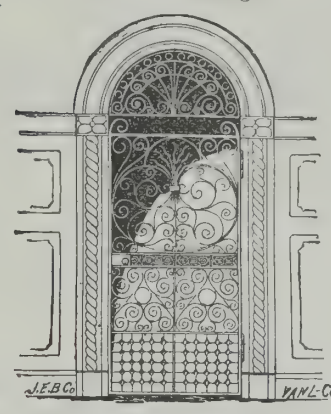
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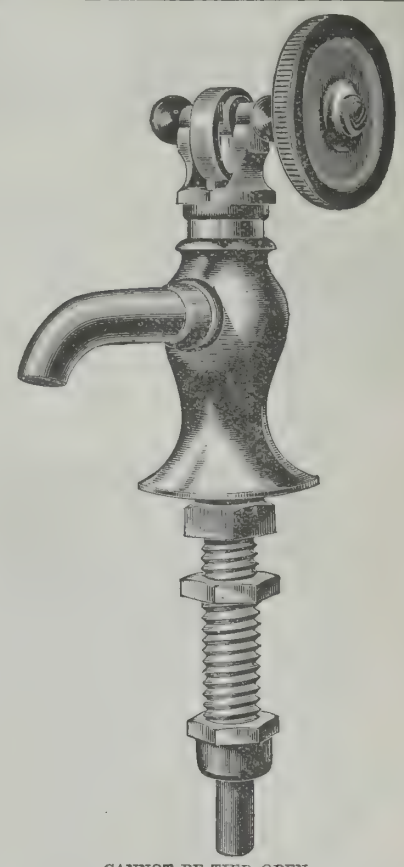
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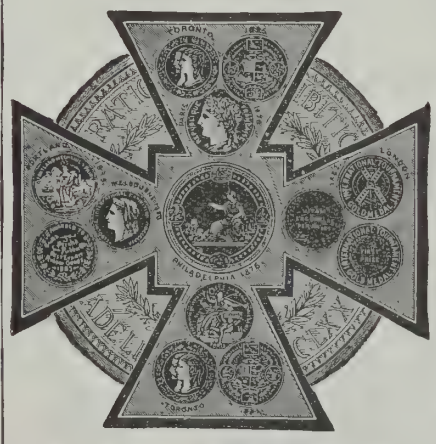


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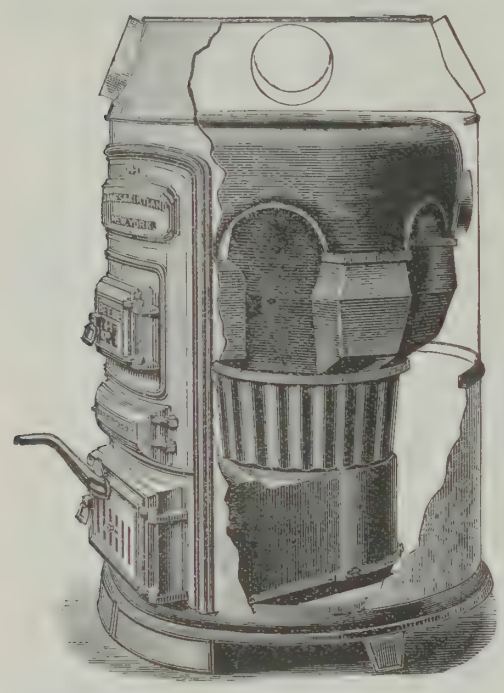
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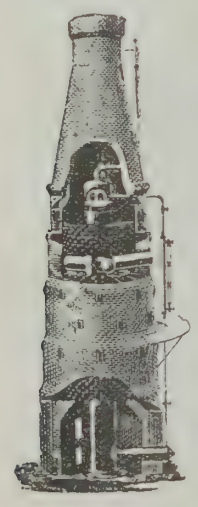
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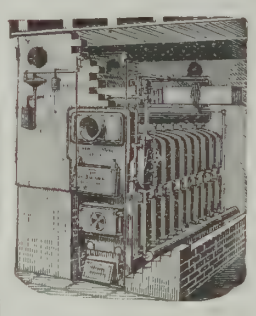
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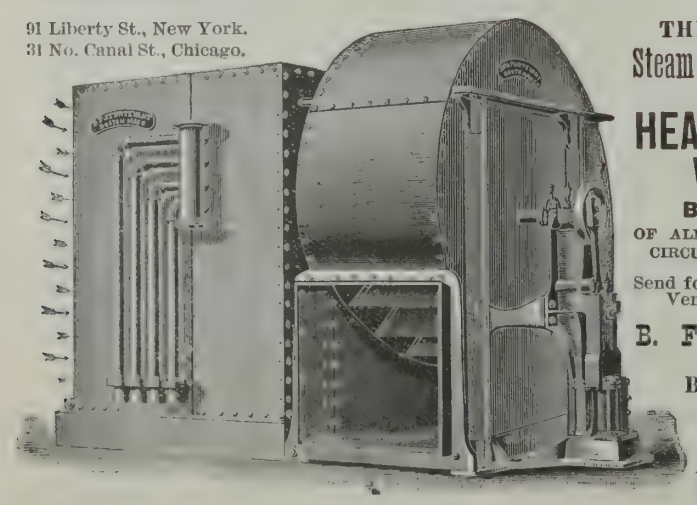
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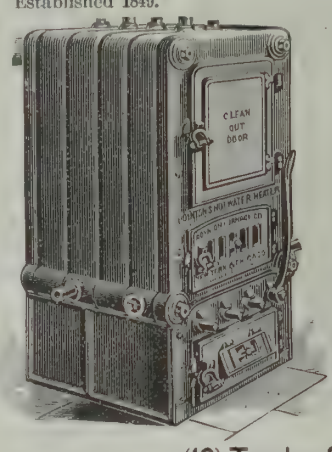
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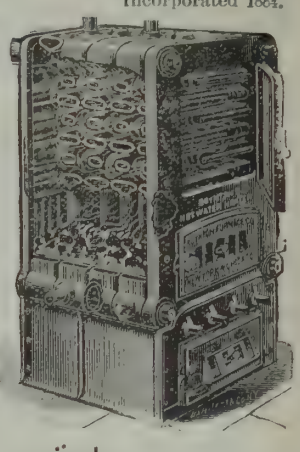
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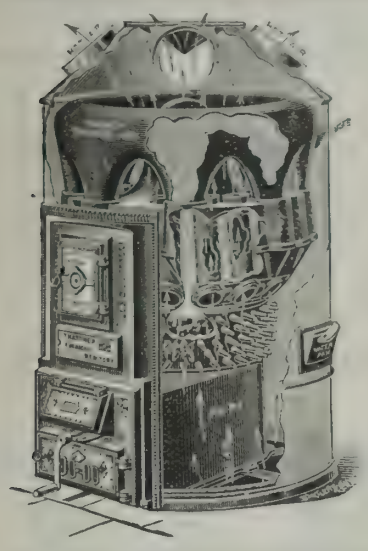
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F & W Co's HEATING APPARATUS

HOT WATER STEAM & WARM AIR FURNACES

50 YEARS EXPERIENCE AS HEATING & VENTILATING ENGINEERS. FOR INFORMATION, APPLY TO YOUR STEAM FITTER, OR FURNACE DEALER, OR SEND FOR ILLUSTRATED PAMPHLET. MAILED FREE.

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Thatcher Furnace

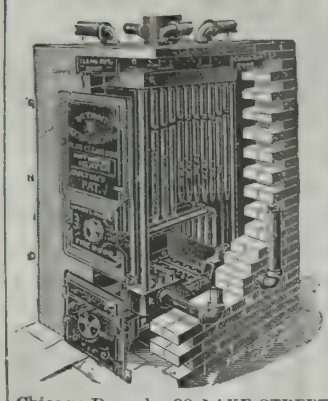
Largest Heating Surface, insuring the Greatest Amount of Heat for the Least Amount of Coal. Durable, Self Cleaning, Gas Tight, Anti-Clinker. Endorsed by prominent Architects and extensively sold to the trade throughout the country.

ESTABLISHED 1850.——————SEND FOR CATALOGUE.

THE THATCHER FURNACE CO.

33 PECK SLIP, cor. Front Street, NEW YORK.

BOLTON HOT WATER HEATER



WROUGHT IRON.

CANNOT CRACK.

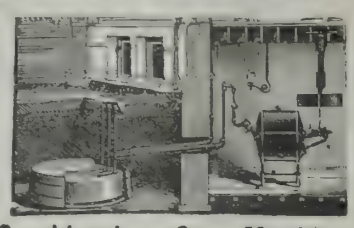
No Bolted, Flanged or Packed Joints. Cannot Leak.

Brick Casing prevents Loss of Heat in Cellar.

Largest Fire Surface, in proportion to Grate Surface.

VERTICAL CIRCULATION, RAPID AND FREE.

Send for circulars.



Combination Gas Machine

Best Independent Gas Apparatus.
Gas for City and Country Buildings.
Average cost ½c. per Hour per Burner.
20 Years without Accident or Failure

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THE LEWIS OPEN FIRE BASE BURNER.

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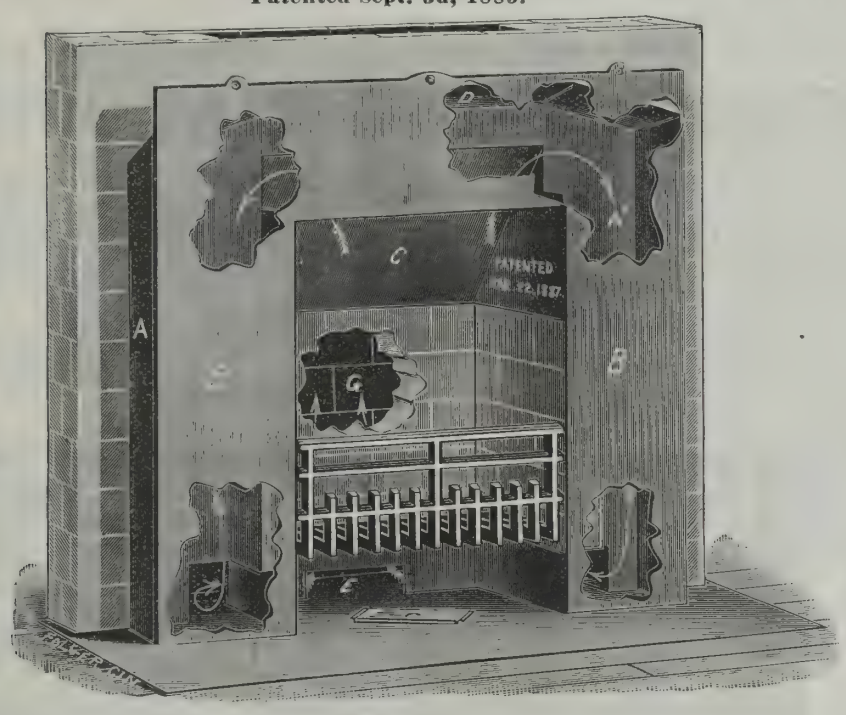


Figure 1.

Figure 1 shows a perspective view, the arrows in broken spaces showing direction of the draft which passes up under lintel D and thence right and left down the flues B B to the hearth, then back to chimney flue and up as shown by the arrows in broken space G in fire-wall. The opening E under fire basket, with door F being left out to show the end of arrows, is for the purpose of removing the soot that may accumulate from dropping down the chimney. Sloping back C and sides of fire-box are made of cast-iron so constructed as to receive the fire-brick or tiling, making a smooth, strong and durable fire-chamber.

What we Claim over a Grate and all other Open Fire Places with Direct Flues:

A more perfect draft. Double the heat with half the fuel. To heat a room in half the time. Entirely excludes soot from the room. Burns soft coal, hard coal and coke. The King of all Fire Places for gas fires. Making a bright, glowing fire, giving out as much or more heat than a Base Burner anthracite stove. No clogging up with ashes, burning freely in every part of the basket. No necessity for stopping up flues during warm weather, but ready at all times to start a fire on cold, damp days. While stirring the fire no ashes will fly out, covering mantels and surroundings; the heat, having no direct escape up the chimney, is held in the fire-chamber and reflected back on the fire, creating a more perfect combustion, then radiated into the room, making an even temperature in every part of it. No danger of chimneys catching fire or houses taking fire from defective flues. It is constructed of cast-iron securely bolted together, greatly facilitating handling and setting. All of its advantages cannot be enumerated; it must be seen in operation to be fully appreciated. We guarantee our Burner to be all we claim.

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552 & 554 W. Sixth Street, - - - CINCINNATI, O.

THE OMEGA VENTILATING GRATE.

An open fireplace that has no equal as a heater and perfect ventilator. Cost reasonable. Catalogue free on application.

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Improved Boilers (with Shaking Grates),

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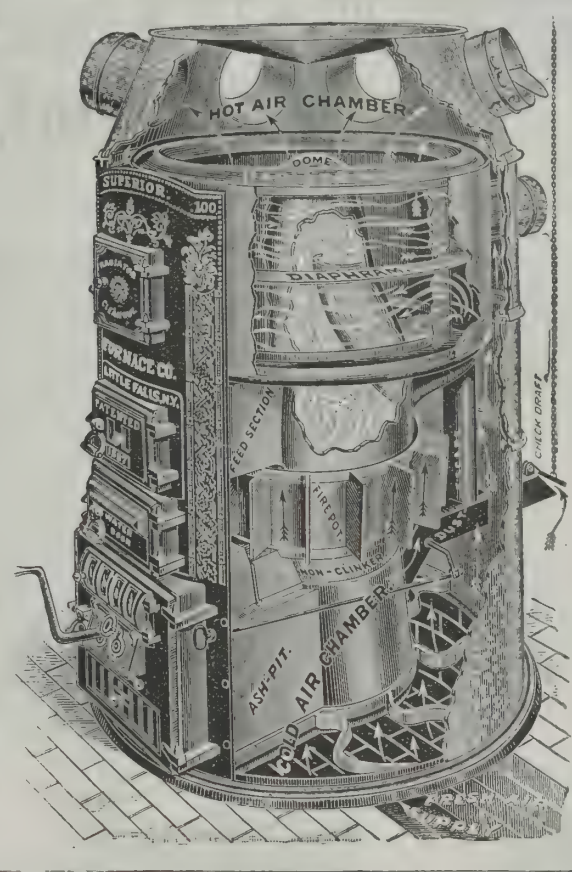
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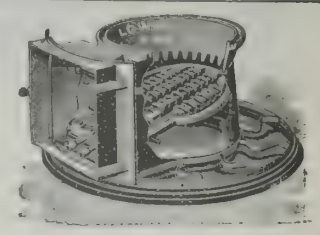
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Erected in any part of the United States or Canada.

A thoroughly Portable Span Roof Greenhouse, 12x8 feet, with Boiler House 4x4 feet, Heating Apparatus and Ventilating Rods included, put up complete (freight prepaid) within 100 miles of New York City for **$325.00**, or delivered on cars in New York for **$260.00**, and any gardener or ordinary mechanic can erect it in one day.





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Easily Operated.

Absolutely Free from Dust, Gas, or Smoke.

We Guarantee Satisfaction.

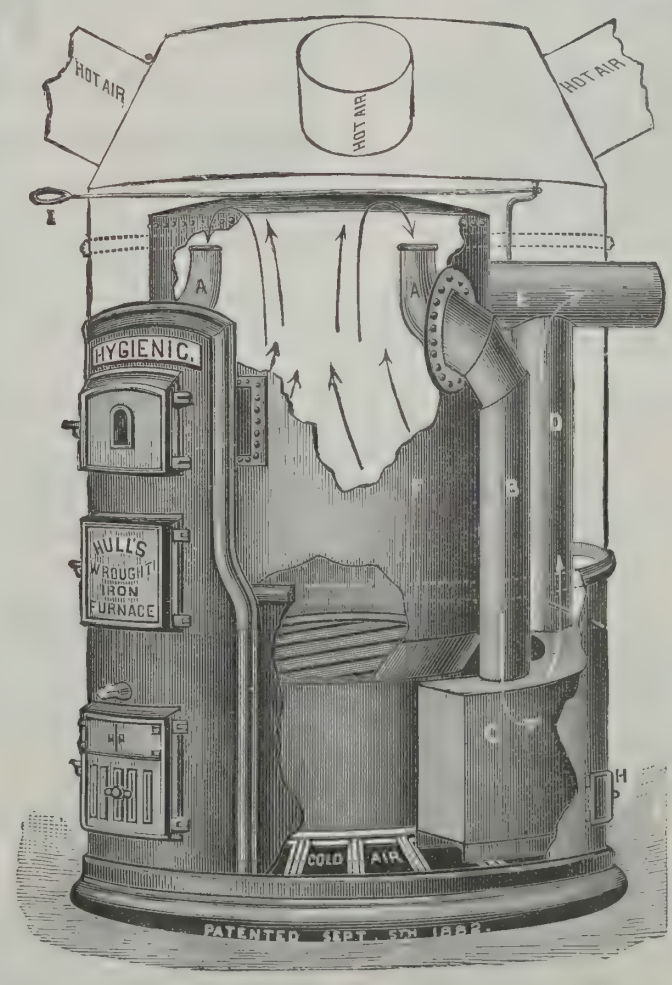
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Four Sizes.—Each Brick Set and Portable.



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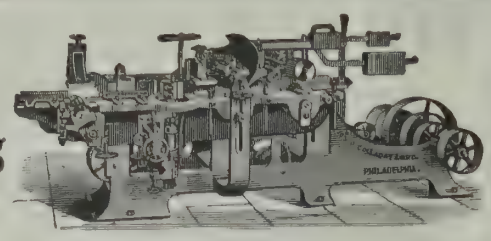
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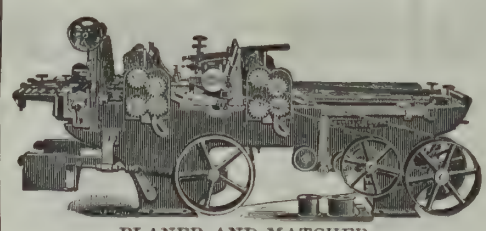


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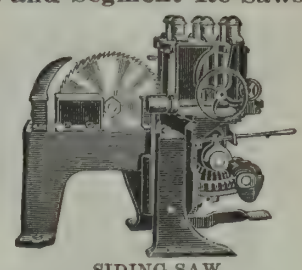
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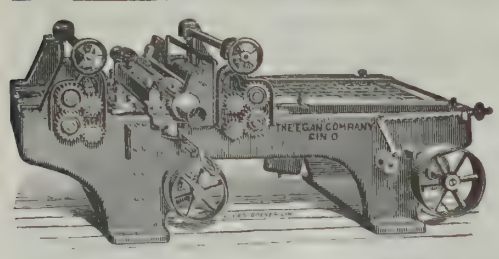


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SIDING SAW.

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No. 3 Planer and Matcher.
Planes 24 in. wide; matches 14 in. wide. With Drop Matcher Attachment.
No. 4 same as above with two cylinders to plane both sides.

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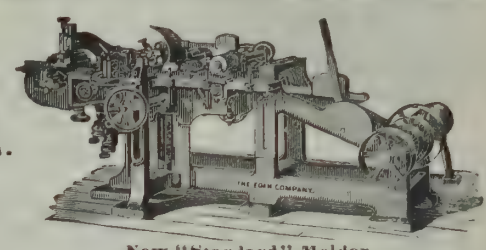
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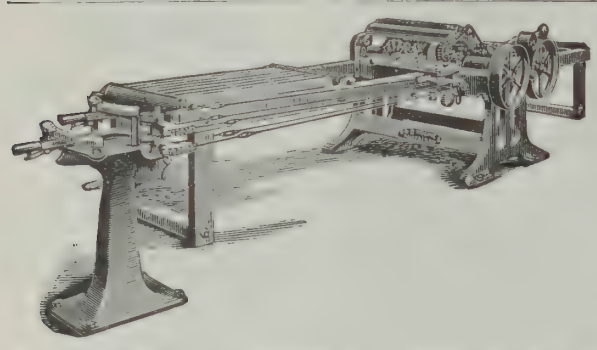
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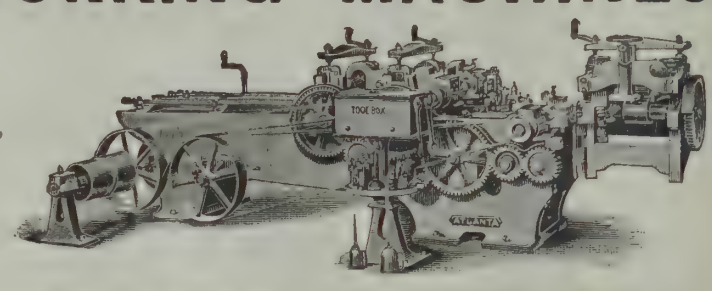
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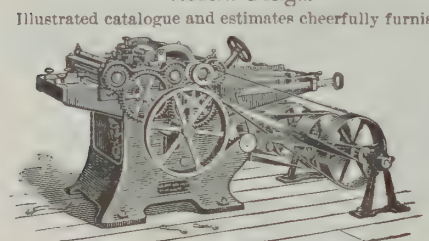
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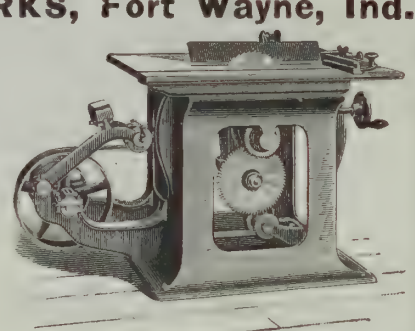
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No. 3 OSAGE STREET.
Builders of Improved Wood-working Machinery of Modern Design.
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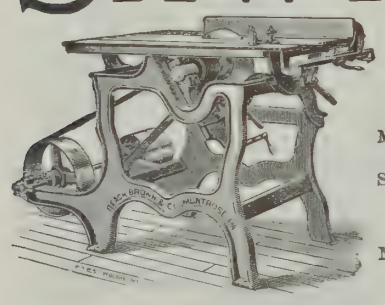
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BEACH'S SCROLL SAWING MACHINES.

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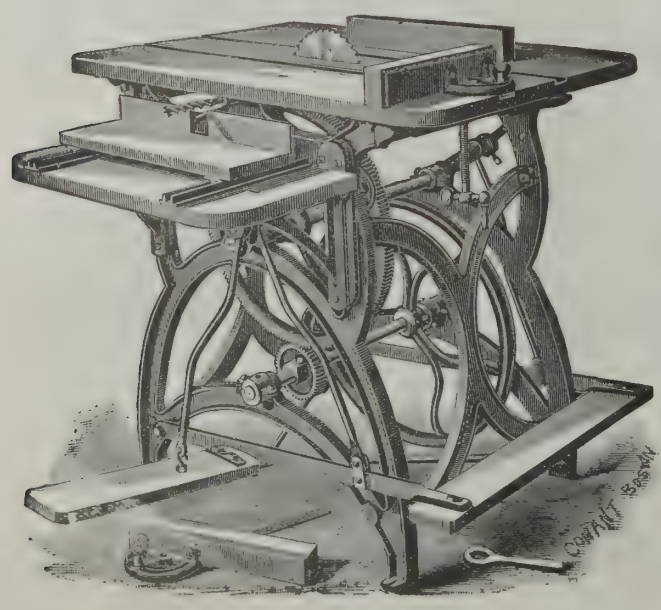


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New York Agency. **Factory Prices.**



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Circular Saw.

Iron frame 36 inches high. Top 30 x 40 inches, centre part of iron with planed grooves on each side of saw for cutting off gauges to slide in. Tipping gauge slides in iron groove. Steel shafts. Gears are all machine cut from solid iron. Boring table and side treadle. Two 6-inch saws and two cranks with each machine. Weight 350 pounds.

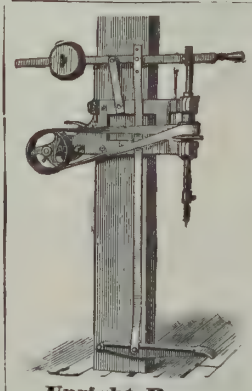
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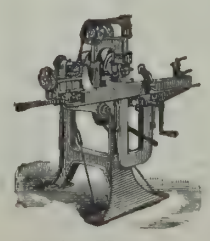
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GLASS PHILLIP SEMMER GLASS CO. LTD. PLATE, SHEET & LOOKING GLASS Depot No. 12 & 14 DESBROSSES ST. NEW YORK. WRITE FOR QUOTATIONS.



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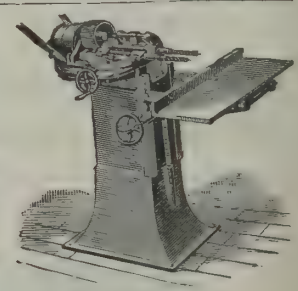
Special Machinery.

SHAFTING, PULLEYS, HANGERS, ETC.,

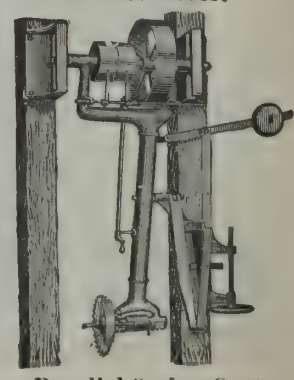
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BEST MATERIAL FOR WALLS AND CEILINGS

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Best for the Owner.——Best for the Contractor.——Best for the Plasterer.

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We were the first to bring out foot and hand power machines which were practical for workshop use, and are to-day the only house in the world making a complete line of such machines suited for the different requirements of the carpenter and builder.

With an outfit of these machines the carpenter is placed in a position to compete on even terms with steam power machinery, and is thus able not only to hold his fair share of the business, but to extract therefrom a larger profit than would otherwise be possible.

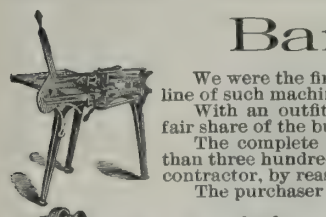
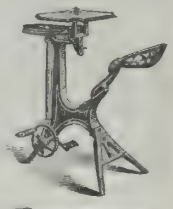
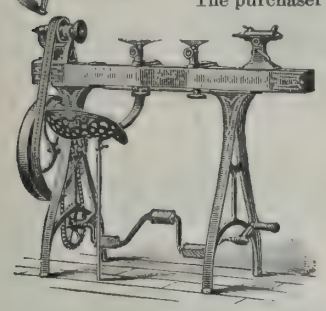
The complete outfit of the machines represented on this page, together with full assortments of knives, chisels, cutter heads and other accessories, would cost less than three hundred dollars. Suppose we figure the interest on the outlay at 10 per cent., or thirty dollars a year. Over and against this it is perfectly safe to say that a contractor, by reason of the advantages these machines give him, will more than save their cost every season. What better investment could be made?

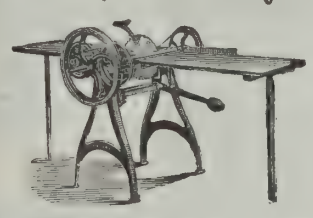
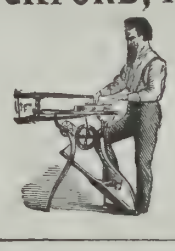
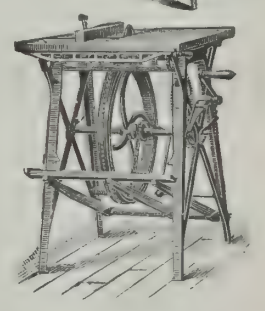
The purchaser can take the complete outfit, or only one or more machines, at a time, as his requirements may demand.

MACHINES ARE SOLD ON TRIAL.

Send for our Catalogue and Price List, which gives full descriptions of the different machines we make.

W. F. & JOHN BARNES CO., 567 Ruby Street, ROCKFORD, ILL.

SAVE MONEY. Before you buy a **BICYCLE or TYPE-WRITER** Send to **A. W. GUMP & CO., Dayton, Ohio,** for prices. New Bicycles at reduced prices and 400 second hand ones. Difficult repairing. **Bicycles, Guns and Type-Writers** taken in exchange.

EUREKA SPIRAL SCREW DRIVER.

Push on the end of the handle and the screw goes in.
Two sizes—No. 1, $1.25; No. 2, $1.50.
For sale by all leading Hardware Dealers. Ask to see it.
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DECATUR COFFIN CO., - - Decatur, Ill.





VICTOR SCROLL SAW.

Has upper and lower spindles, adjustable tension spring, dust blower, drill, tilting table, etc. Suitable for close and very accurate work. Cuts up to 3 inches thick; swings 24 inches.

PRICE, with 12 Saw Blades, **$40.**

Has powerful treadle motion, cuts rapidly and is easy to operate. Can be arranged for steam power if desired. Weight, 230 lbs.; boxed, 340 lbs.



PARAGON SELF-FEED RIP SAW.

FOR RIPPING, GROOVING, ETC.

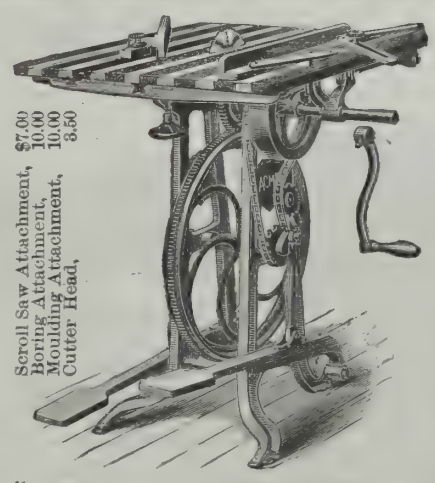
Strong, substantial and large capacity. Has two changes of speed, three changes of feed, extension table, etc.

PRICE, with one 10-inch Saw, **$50.**

One man can rip 600 feet per hour, 1 inch pine; Hardwood in proportion. Cuts up to 3½ inches thick, works accurately, saves time, lumber and labor. Weight, 245 lbs.; boxed, 335 lbs.

PRICE LIST OF EXTRA ATTACHMENTS.

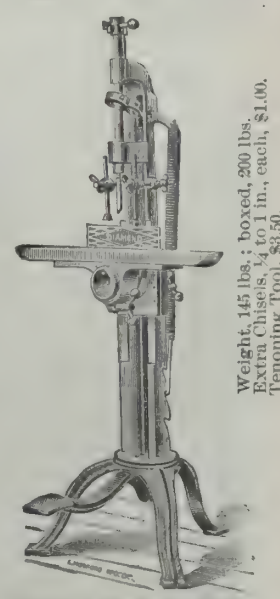
Scroll Saw Attachment,	$7.00
Boring Attachment,	10.00
Moulding Attachment,	10.00
Cutter Head,	3.50



"ACME" COMBINATION SAW.

For Foot and Hand Power. Suitable for Cutting-off, Light Ripping, Mitring, Rabbeting, Grooving, Gaining, Dadoing, Edging up, Jointing Stuff, and with the addition of the extra attachments, Scroll Sawing, Boring, Variety Moulding, Beading, etc.

PRICE, as shown in cut, with two 7-in. Saws, **$40.**



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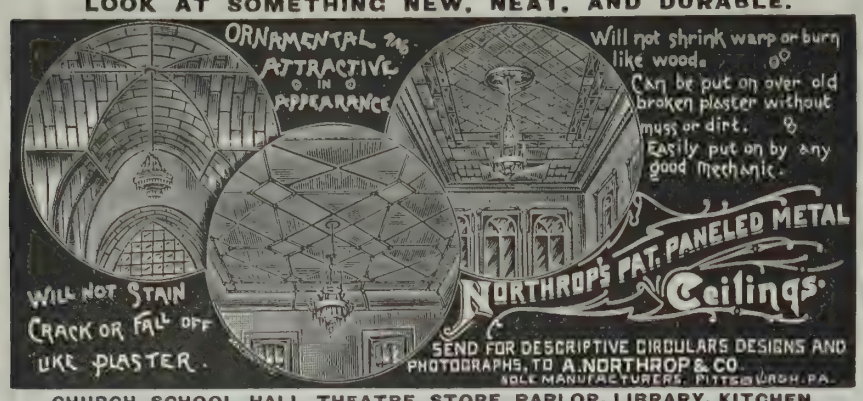
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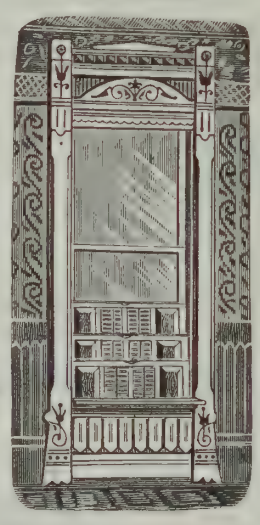
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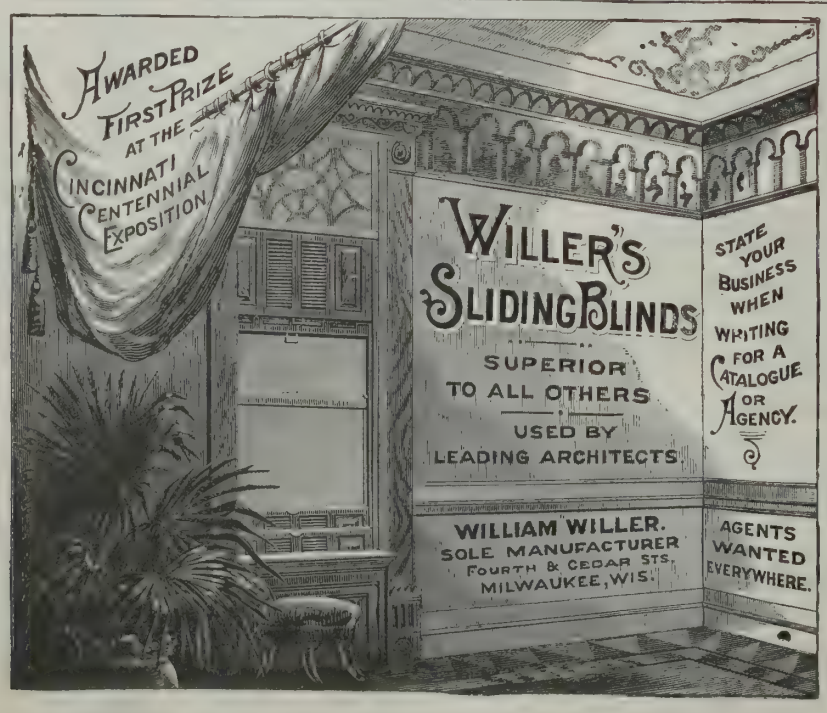
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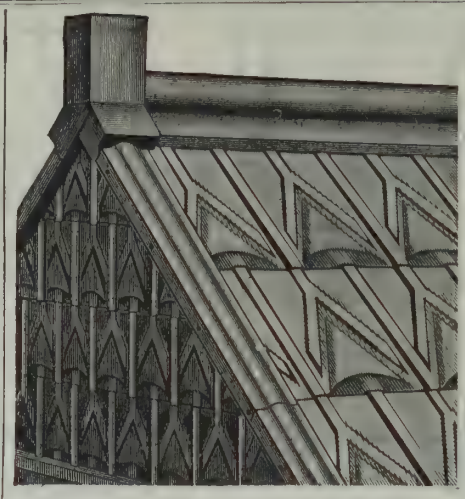
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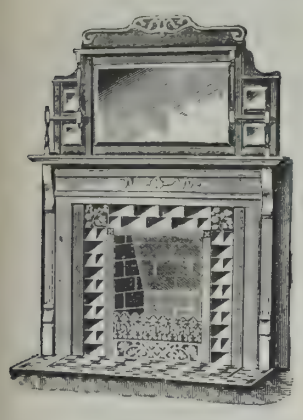
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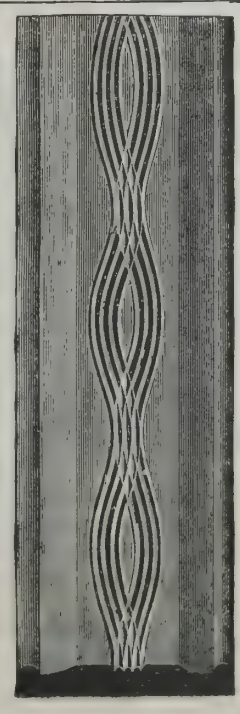
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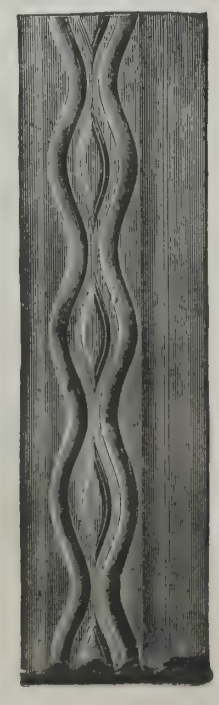
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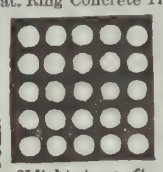
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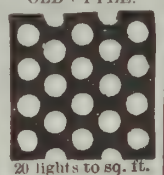
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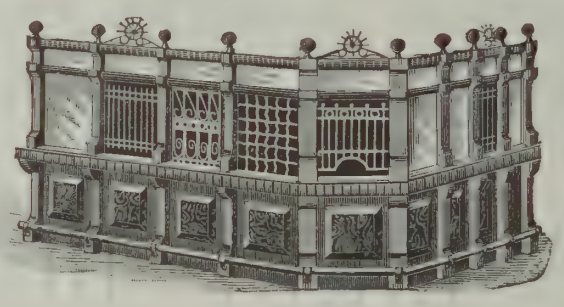


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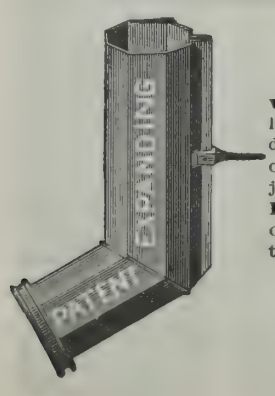
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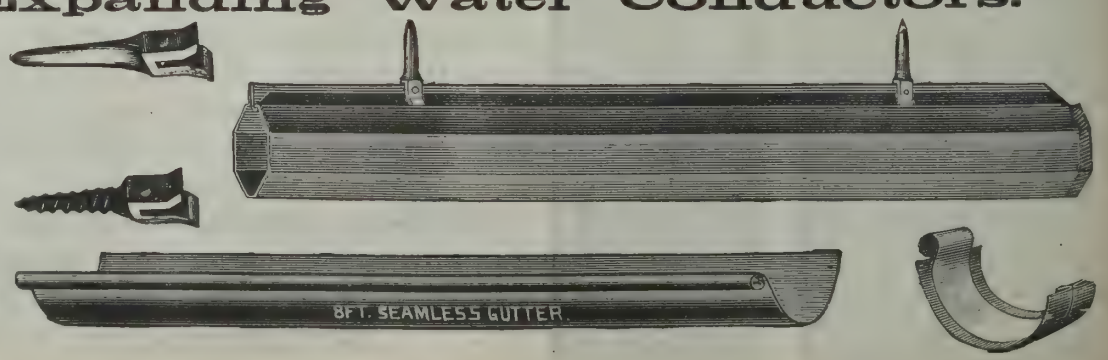
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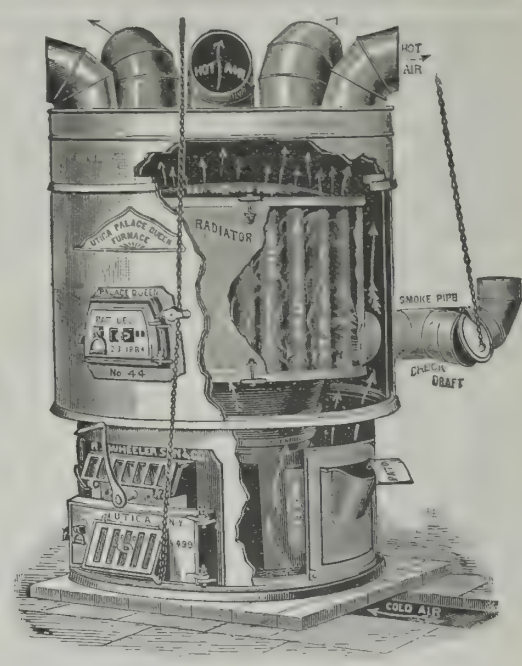


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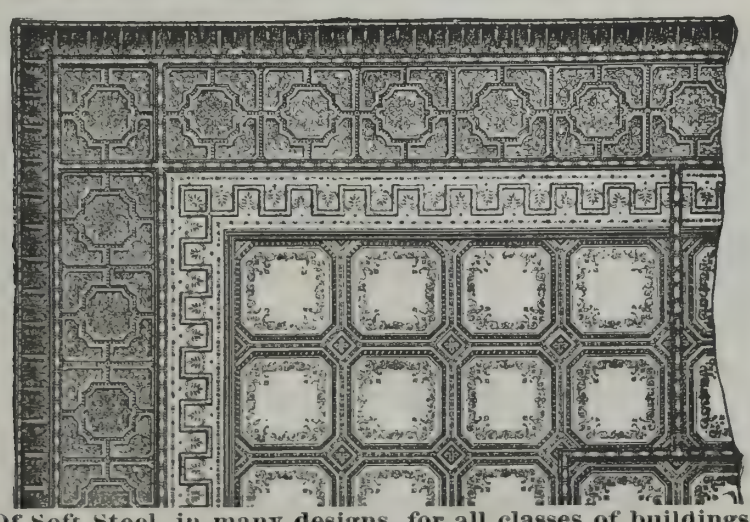
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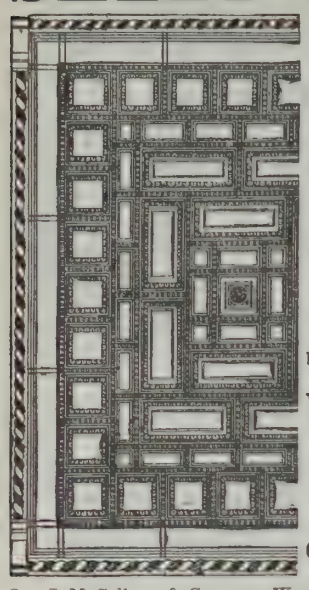
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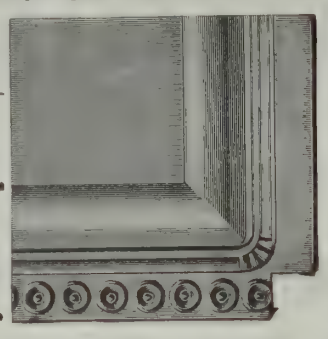
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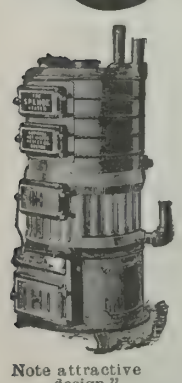
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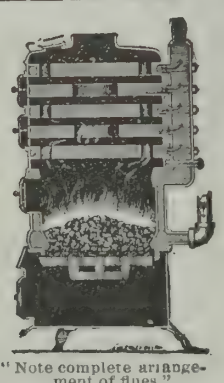
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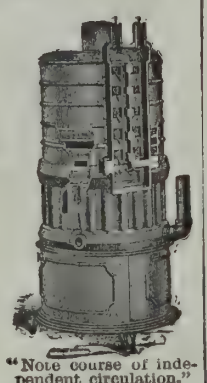
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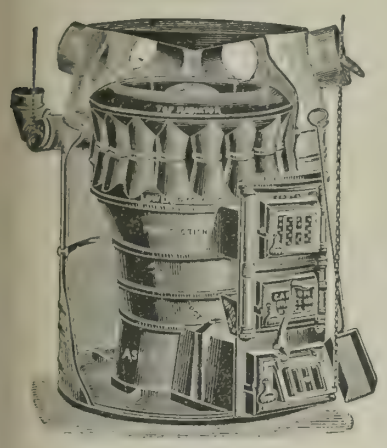
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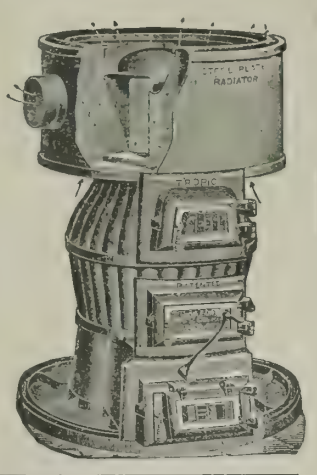
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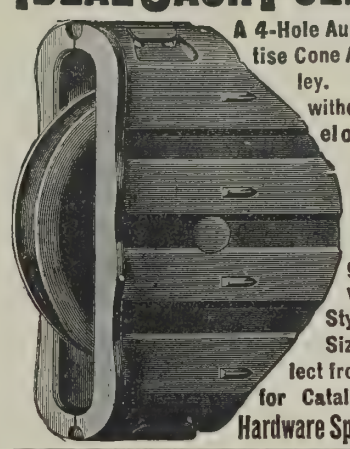
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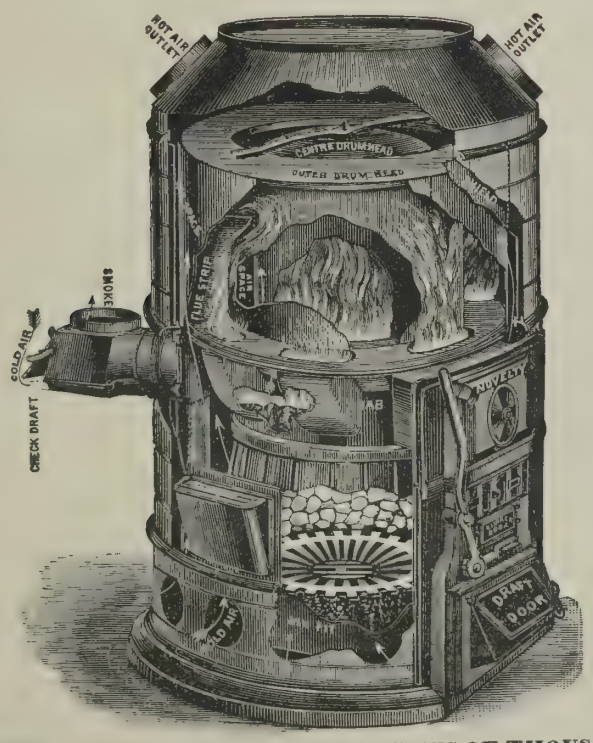


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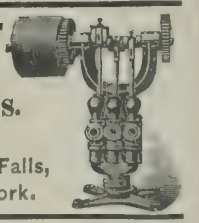
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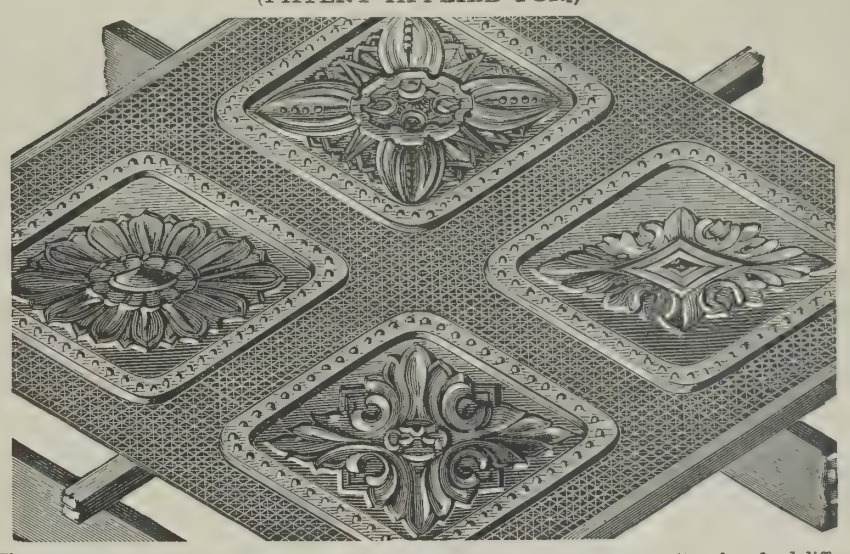
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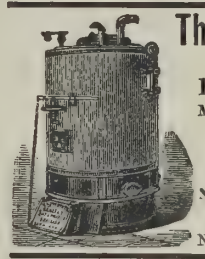
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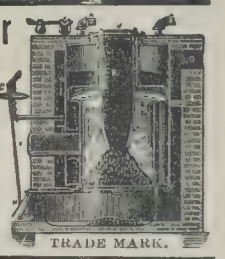
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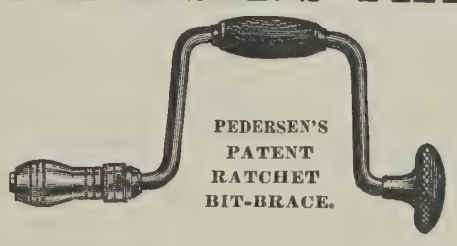
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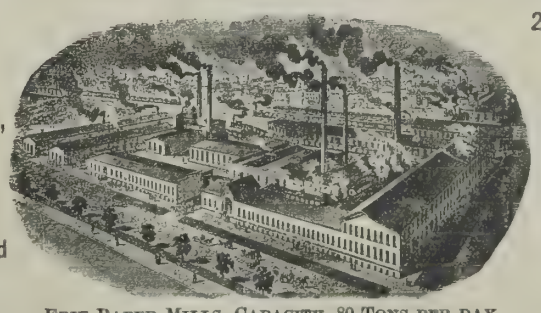
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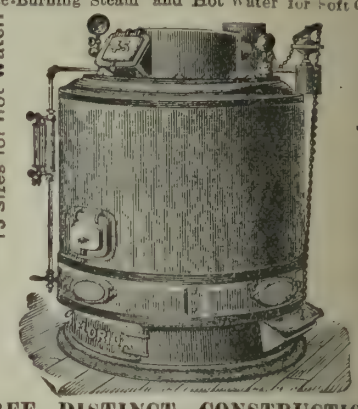
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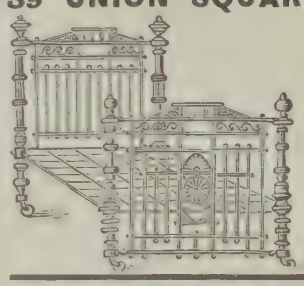
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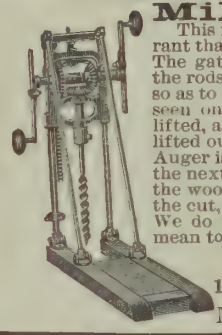
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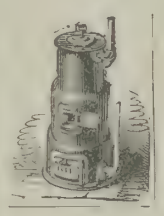
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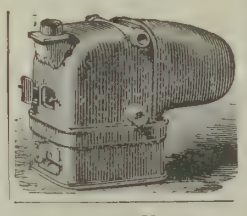


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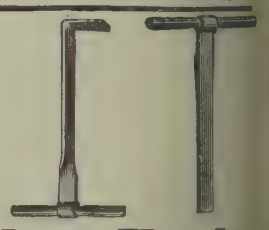
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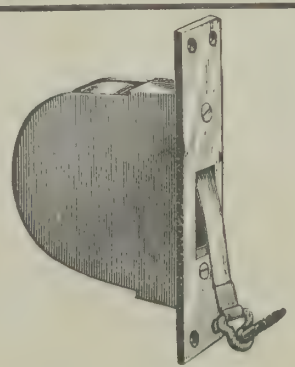
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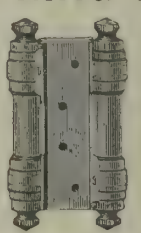
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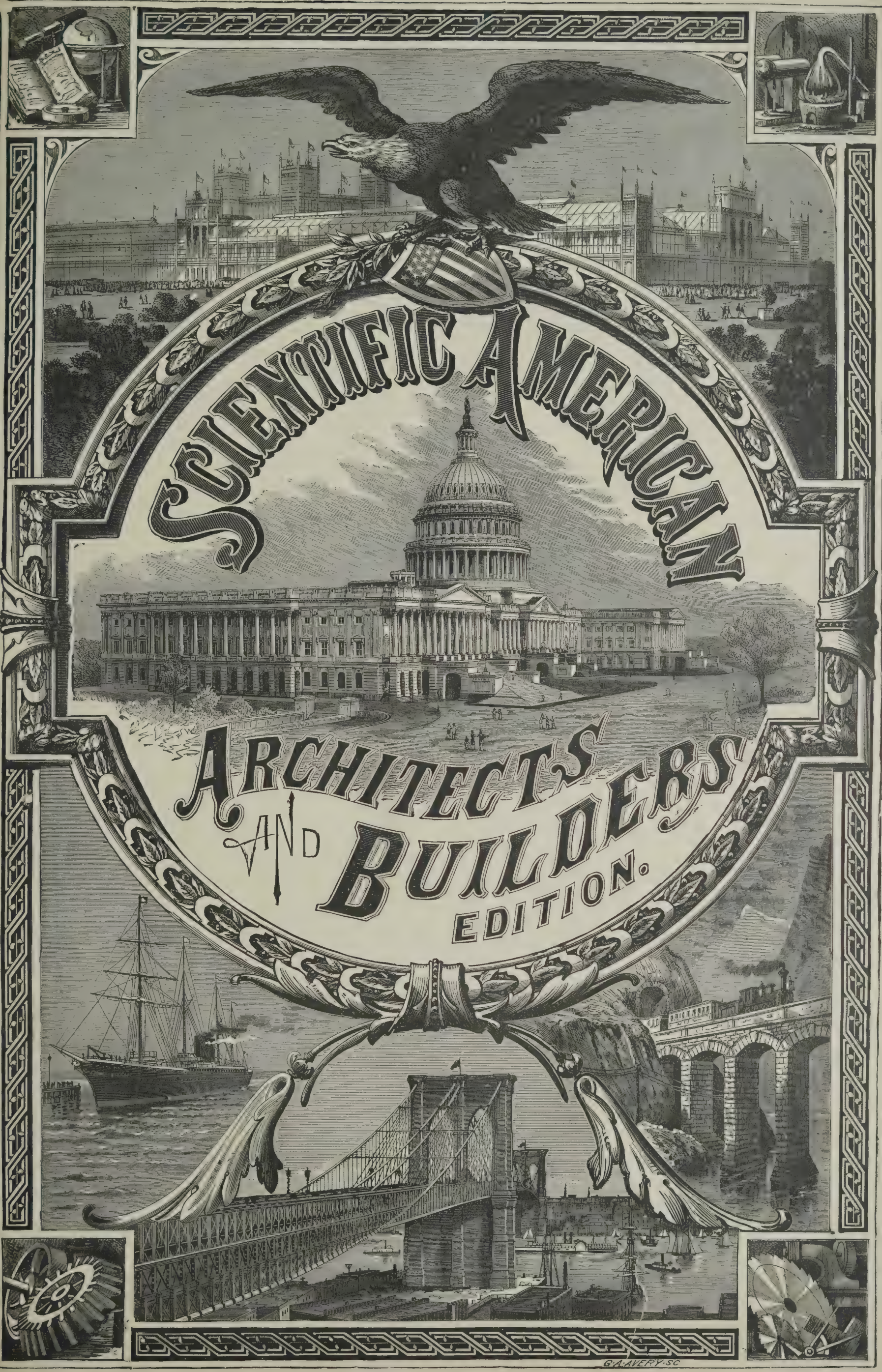
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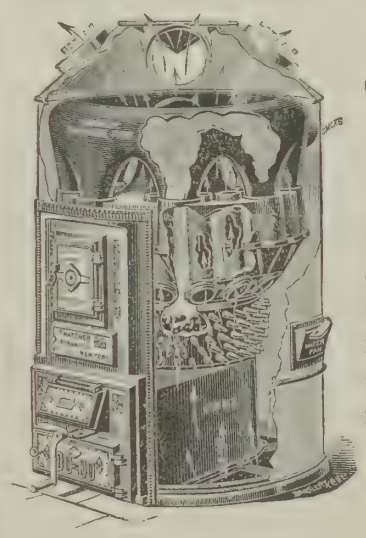
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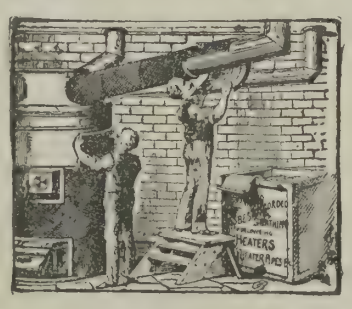
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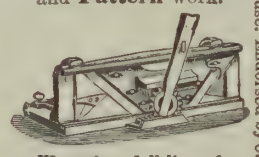
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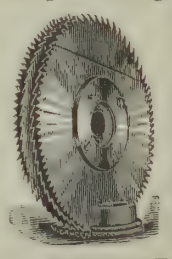
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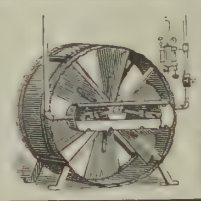
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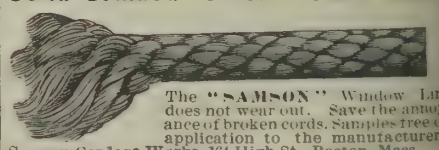


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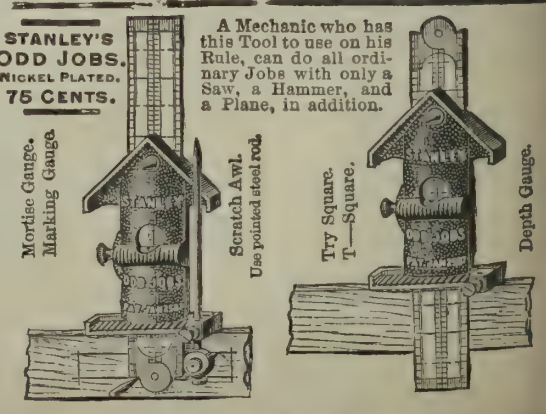
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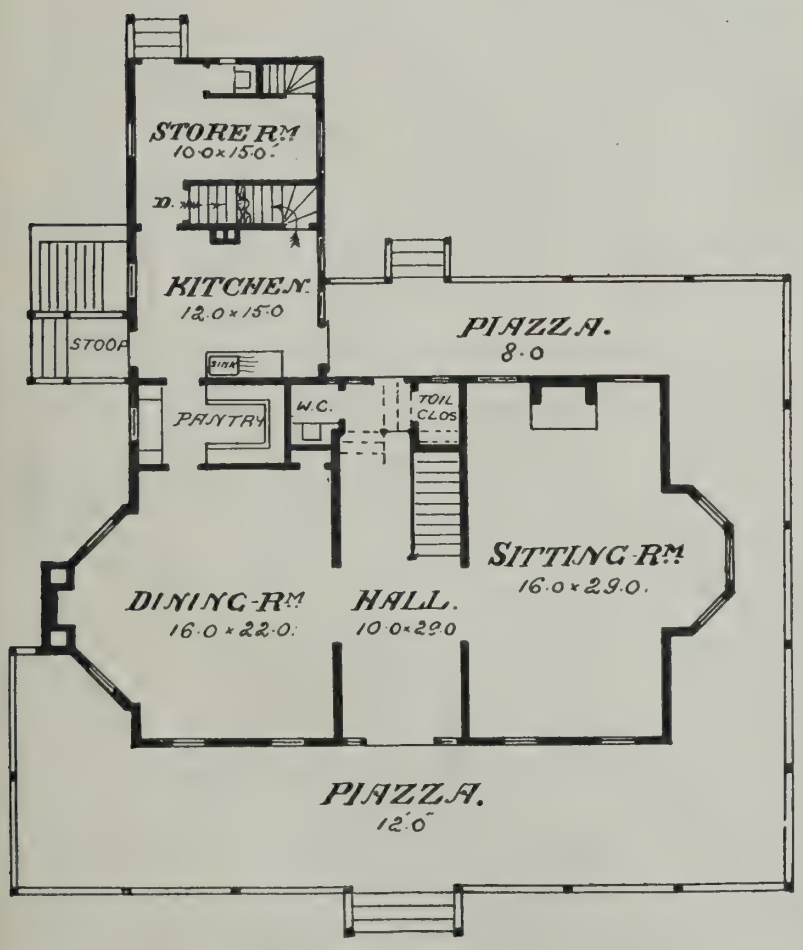
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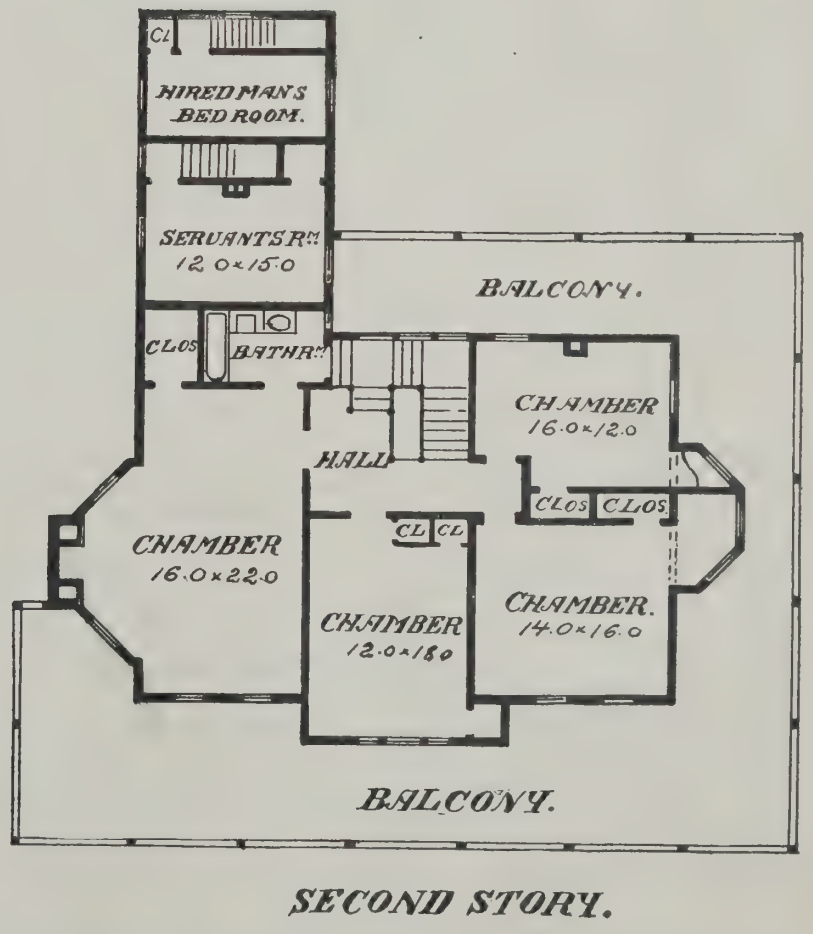
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ARCHITECTS AND BUILDERS EDITION.

Vol. X. Subscription, $2.50 a Year. NEW YORK, NOVEMBER, 1890. Single Copies, 25 Cents. No. 5.







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A LAKE COTTAGE IN MINNESOTA.—[See page 70.]

Scientific American.

ESTABLISHED 1845.

MUNN & Co., Editors and Proprietors,

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

NEW YORK, NOVEMBER, 1890.

THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

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SOME OF THE MERITS.

The next number of our journal completes the year, when an excellent opportunity will be afforded for the entry upon our books of new subscriptions. We rely upon our large host of present readers to make known to their friends the merits and value of this periodical, thus aiding us in the augmentation of our list and the consequent improvement of the work.

One of the distinctive features of our publication is the presentation in every number, both in colors and in half-tone prints, of new and fresh collections of photographic views showing recently built dwellings, and other structures, with the floor plans. In this way we place before the reader a great variety of the very latest and most approved forms of construction, not from one locality only, but selected from every part of this great country. Wherever good taste prevails in the display of architecture, especially in the branch pertaining to homes and dwelling houses, there the artists of the SCIENTIFIC AMERICAN, with their cameras, do sooner or later make their appearance.

The usefulness and influence of our periodical is now widely and permanently established. Many of those who contemplate the erection of buildings now consult its pages for good plans and elevations, which are here given in numerical profusion.

The practical builder finds the SCIENTIFIC AMERICAN to be almost a necessity for himself and for his customers. With the plans and photographic elevations which we give, the builder is enabled easily to modify or to duplicate any of the structures we illustrate.

The photographs show the exact form, position, and details of the principal parts, and the builder is never at a loss how to proceed. Of these facts we have the most abundant and convincing testimonies. Many thousands of new buildings have been and are constantly being erected in all sections of the country from the plans given in the SCIENTIFIC AMERICAN, and as a result there is to be seen on every hand a marked and growing improvement in architectural styles. Builders now aim to select, even for the cheapest houses, the most tasteful designs, and of these the SCIENTIFIC AMERICAN regularly furnishes to them an abundant and satisfactory supply.

When the design of the building is selected and the work of construction begun, the next subject for consideration is the plumbing, the warming, the lighting, the hardwaring, the glazing, the adorning, the painting, the finishing, and finally the furnishing and household fittings of the building. In all of these matters the pages of the SCIENTIFIC AMERICAN teem with the most valuable information. Here may be found the illustrated announcements of the most reliable manufacturers of every class of materials, goods, and appliances required in buildings. In this department of the paper upward of two hundred engravings are given in every number. The value as a convenience to the reader in having constantly at hand an illustrated, comprehensive directory of the latest productions cannot be overestimated.

A LAKE SIDE COTTAGE.

On our first page we give a perspective and floor plans of a Lake Side cottage, at Minnetonka, Minn. Horace Henry, Esq., owner; W. H. Dennis, architect, Minneapolis. We are indebted to the *Northwestern Builder and Decorator* for our illustrations. One of the pleasing features of this cottage is the broad and extensive piazza, and the corresponding balcony on the second floor. The architectural effect of the exterior of the building is striking and effective. The expense of such a summer house is probably from $3,500 to $4,000, or more, according to interior finish.

A MODERN DWELLING, WEST END, CHICAGO.

In this issue we publish two floor plans and colored view of the above residence, and on page 75 we give a sheet of details. The house is pleasantly situated, being well surrounded with foliage. The veranda extends across the entire front and returns into the main chimney stack on the side, the same being supported by six turned columns with carved capitals. The parlor is 14 ft. by 16 ft., being connected with the hall and library by means of sliding doors. The library is 14 ft. 6 in. by 16 ft., with a three-centered arch over the bay. The dining room is 14 ft. by 14 ft. 6 in., with a mullioned window, and connected with the hall by sliding doors. You go up and down, respectively, from the back hall to second story and basement. The rear porch is entered off this hall. The kitchen is 13 ft. by 16 ft. 6 in., fitted with a cupboard, range, and sink. There are five chambers on the second story, each being provided with a closet. The toilet room is at the end of the corridor, fitted up with bath, water closet and hand basin. There are three good attics. The house is built of frame construction on a stone foundation and is of a pleasing design. Owner, Geo. Middendorf; architect, J. De Howarth.

Our colored plate was made direct from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

A $1,400 COTTAGE AT CHICAGO.

One of our colored plates this month shows a perspective of the above cottage, and two floor plans. A sheet of details is given on page 78. The house stands on a 25 ft. lot. A piazza extends across the front and partially down the side. The parlor is 11 by 12, with large opening into hall with portieres. The dining room is 12 by 14, connected with hall by sliding doors. The kitchen is 12 by 14, with range, sink, rear porch, and convenient closets. On the second story are four chambers and toilet room fitted up with bath, water closet etc. The house is of frame construction, built upon a solid foundation of brick. It is cellared throughout. The height of the basement story is 6 ft. 8 in. The height of first story is 9 ft. and of the second story 8 ft. The estimated cost is $1,400. Owner, Fred. J. Aitken; location, Stewart Avenue. Architect, J. M. Young.

Our engraving was made direct from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

[THE SANITARY NEWS.]

The Air Supply.

The season is now at hand when doors and windows will be kept securely closed. Rubber mouldings, storm doors and other appliances are used to keep out the health-giving air. Many of our houses are heated by furnaces. Some of the apparatuses are supplied with fresh air through a wooden or tile pipe or duct leading to the outer air, and to these supplies I wish to call your attention, and to the necessity of at once making an examination of their condition. The overflow of our sewers and flooding of our basements some time ago left many of these fresh air supplies filled with sewage. This deposit, even if the water is fully evaporated, remains in the shape of fine dust, and will be carried through the house as soon as the furnace is put in operation. That sediment contains all the elements of sewage and is under conditions the most favorable for the development of bacteria, warmed into life to be breathed into the lungs of delicate women and children. Under these conditions there can be only one result—sickness and death. Plumbing and sewers may be perfect, and every other condition favorable about the premises, but the unseen air supply a deadly poison. It is not an unfrequent occurrence to find the wooden air supply the nesting place of rats and filled with bones, etc, dragged there by vermin, water bugs, and worms, which swarm in the decayed wood. See to it that your house is in order.

In many houses the furnace air supply is drawn from the basement in which the furnace is placed. As there are usually laundry tubs, slop sink, and a servants' water closet, the latter usually of the cheapest construction, in the basement, and all this in close proximity to the furnace, the quality of the air furnished up stairs may be imagined.

It is no uncommon thing to find the cellar loaded with cabbage, potatoes, and other vegetables for use during the winter. The odor from them and the steam, etc., arising from the use of the laundry, is undoubtedly the cause of much sickness.

Much might be written on this subject, but I have said enough to point out the evils I have seen in many so-called good houses. A. YOUNG.

The Alhambra.

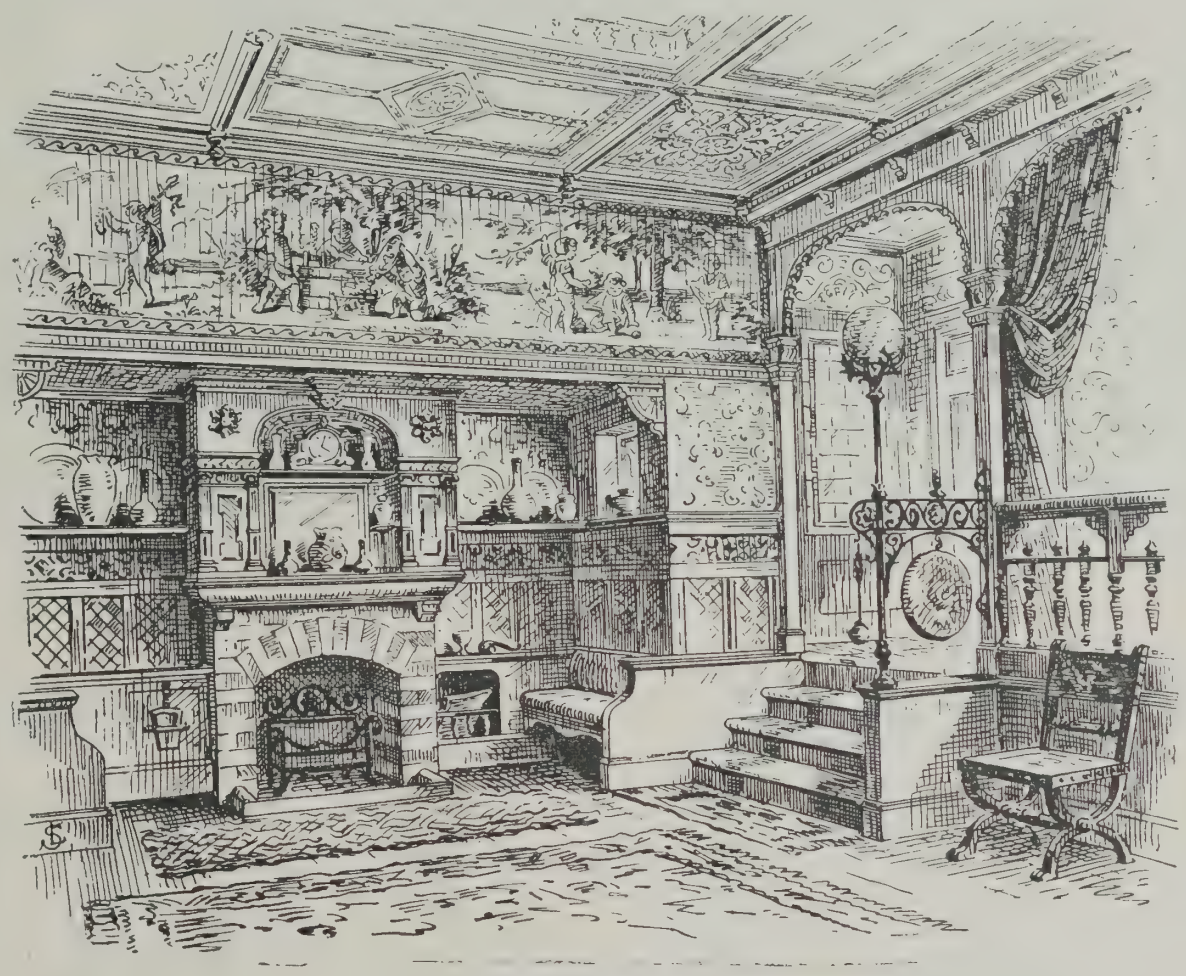
All students of history and admirers of ancient splendor will hear with keen regret of the casualty which has happened to the Alhambra, that magnificent monument to a fallen race, which an illustrious American writer brought to the renewed attention of civilization. A year ago a hurricane blew down some of the marble columns, and recently a great fire, supposed to be the work of an incendiary, destroyed several of the finest rooms and halls of the palace. In all the strange and incomprehensible history of Spain there is nothing that engages curiosity more than the share of the Moors. A renowned Scotch historian has given luminous prose a living picture of Charles V.; a brilliant American has lingered over the deeds of Ferdinand and Isabella the Catholic; the same hand has vividly portrayed the gloomy piety and religious bigotry of Philip II.; these have many fascinations for all who wish to know the past, but they yield in interest to the half-hidden history of the Moors, who for seven hundred years held the finest parts of Spain, and established there the highest civilization of the East. The Alhambra is the most imposing relic of their architectural taste and skill, and it is the greatest attraction in Spain for the curious and scholarly. Not much is left in Spain to prove her former grandeur. The inquisitive may visit the monastery at Yuste, where the great Charles retired to live the life of a monk; the Escurial yet stands a monument to his fanatical son; the Mosque of Cordova still bewilders with its innumerable columns, and the Alhambra is a familiar name to every school boy, but the historic treasures of Spanish architecture are not numerous. The destruction of the Alhambra, the greatest of them all, would be a loss to the whole civilized world.—*Louisville Courier-Journal.*

DECORATION OF ENTRANCE HALL.

We have in this exhibit of Messrs. Geo. Dobie & Son, of Edinburgh, several of the leading decorative materials now so much in vogue before us. The main ceilings are of Tynecastle canvas, the dado paneling and border (the latter of very bold relief) being of the same material. The ceiling of the fireplace recess is covered with anaglypta, and a fluted pattern of the same gives itself happily to the door panels. Here a bright idea suggests itself to the house painter; when he finds a door old and dilapidated, which will involve labor and expense in preparing for paint, let him introduce a bit of anaglypta. The fillings are of two different designs of another embossed material, the decoration of which is a specialty of the firm. That in the hall proper is very elaborately decorated and surrounded with a thin belting of linerusta, studded with nails, while that in the staircase is simpler in treatment, without showing exactly the two extremes of gaudiness and simplicity. In the hall, again, the filling is surmounted by a handsome figure frieze, hand-painted after the manner of tapestry, and symbolic of the seasons, the painting of the figures herein forming a very important part indeed in the general appearance of the whole.

The overmantel and mantelpiece, with the quaint ingle nook seats, the balustrade, with its plush-covered handrail, the wrought iron electrolier and gong, and finally the little conservatory leading off, all play their parts in bringing everything into a happy unison, and under the influence of the electric light a most charming effect is produced. In order to admit as much light as possible during the day (without doing away with or spoiling a ceiling), a series of panels of a new unbreakable pliable material is brought before us in this exhibit. While preventing any one seeing in or out, it precludes light without obstructing it altogether, and consists of wire, woven in a kind of gelatine substance, and manufactured by the New Wire Wove Roofing Company (Limited), London. It is very suitable in the present case, and we also notice how it lends itself to decoration. Externally, some decoration after the manner of sgraffito work is shown.

This exhibit will undoubtedly well repay a visit, especially to those interested in decorative art, admirable specimens of almost every branch of our art being here represented. The whole is designed, built, decorated, and furnished entirely by Messrs. Geo. Dobie & Son, the very bricks of the mantel being moulded in their own premises, and is well calculated to sustain their reputation as artistic decorators, and we trust that their present exhibit will not only increase their already wide connection, as it deserves to do, but that it will give an impetus to more of our friends to follow suit at the next great exhibition.—*Journal of Decorative Art.*



AN ENTRANCE HALL.

A DWELLING AT HOLLIS, LONG ISLAND.

Our engraving, page 72, illustrates a dwelling erected for Mr. C. F. Hills, at Hollis, Long Island, at a cost of $6,000, complete. Schwietzer & Diemer, of New York, architects. Dimensions: Front, 36 ft. 6 in.; side, 52 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft. Underpinning, brick, laid in red mortar. First story clapboarded, and balustrade to piazza. Second and third stories shingled. All painted light brown with dark brown trimmings. Roof slated. The trim throughout the interior is of whitewood, stained and finished in mahogany. Floors of hard wood. Hall contains an ornamental staircase, lighted by stained glass windows. Parlor and library have open fireplaces, tiled hearths, hard wood mantels. Hall and dining room similar mantels. Butler's pantry and kitchen are wainscoted and fitted up complete. Second floor contains four bed rooms, den, and bath room, the latter wainscoted and provided with all the conveniences. There is a large open attic, and several rooms can be finished off if desired. Cemented cellar contains furnace. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT HUMBOLDT PARK, CHICAGO. COST $3,200.

We give in this issue, on page 73, a photographic view and two floor plans of a cottage at Humboldt Park, Chicago. The hall is commodious, with a returning staircase leading to the second story. The parlor has an angle fireplace and an octagonal bay. The size of this room is 14 × 16. It is connected with the library by sliding doors, with an open grill over. The library is 12 × 14, an angle fireplace, and well lighted. The dining room is 12 ft. 6 in. × 16 ft. The kitchen is 12 × 17 ft. 6 in., fitted with a range and sink, rear porch, etc., and a back staircase. There are four chambers on second story, toilet room with bath, w. c. and hand basin. Each chamber has a commodious closet, and the principal chamber has a commodious dressing room. The house is built of a frame construction on a stone foundation, and the estimated cost is $3,200. Owner, A. L. Moore P. W. George, architect. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE NEAR NEW YORK.

Our engraving on page 76, made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN, illustrates a colonial house erected for Mr. C. A. Hutchings, at Montclair, New Jersey. W. S. Knowles, New York, architect. Dimensions: Front, 32 ft. 4 in.; side, 45 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 7 in; first story, 9 ft. 6 in.; second, 8 ft. 8 in.; third, 8 ft. Underpinning of dark red sandstone, rock-faced. First story clapboarded, painted colonial yellow, with white trimmings; second story, gables and roof are shingled and left to weather-stain. Columns to piazza are of yellow pine and are finished natural with hard oil. Hall, spacious, is finished in oak, contains an ornamental staircase, fireplace with facings and hearth of brick, and oak mantel, paneled wainscoting and ceiling beams. Floors of hard wood. Parlor, treated with pleasing effect, is finished in ivory white, provided with fireplace with facings and hearth of white tiles, and a carved mantel finished same as trim. Dining room and den are finished in oak, and are separated with a spindle screen, the former having a fireplace with tiled hearth and oak mantel. Kitchen and pantries are wainscoted and trimmed with North Carolina pine finished natural. Second floor trimmed with yellow pine, finished natural, contains four bed rooms with closets and bath room. Attic contains two bed rooms and store room. Cemented cellar contains laundry, furnace, and coal cellar. Cost $5,000 complete.

Questions on Construction.

The following examination papers of the City and Guilds of London Institute may be useful to other students in architecture:

CARPENTRY AND JOINERY.

Ordinary Grade.

1. Give sketches to illustrate how the cutting of timber affects its use, and state how you would prefer timber to be cut from the log, and why.

2. Does slaked lime affect timber? and, if so, state how, and its effect on both hard and soft woods.

3. Give briefly your opinion of the use of machinery in joiners' work, stating the principal machines used, and reasons for or against them.

4. Give section and plan, 1 inch scale to the foot, through a lead gutter behind a stone parapet, showing outlet of gutter, feet of rafters, lead, etc., complete.

5. What is the boldest timber roof of which you have any knowledge? Describe same, and give sketches to illustrate your description.

6. Give an elevation, ¼ inch scale to the foot, of a wooden roof truss for a tiled roof over a 35 feet span. Give the scantlings of the different members, and state what distance the trusses should be placed apart.

7. Give enlarged sketches, 1 inch scale to the foot, of the several joints to the above truss; also dot on any ironwork you may require.

8. Give sections, 1 inch scale to the foot, of "framed," "single joist," and "double floors," and say under what circumstances each would be required, and any objection to the use of either.

9. It is required to frame an upper floor to cover a space of 20 feet by 18 feet, the floor to carry 1½ cwt. per foot super. Show by sketches to the scale of ¼ inch to the foot how you would frame it, and give the scantlings of the timber, showing how you arrive at them.

10. Give sketches (plan and section), ¼ inch to the foot, showing how you would frame a landing stage to a scaffold over a footpath 8 feet wide, leaving a headway of 12 feet. Give enlarged sketches of the framing, and show thereon the sizes.

11. Give a plan and elevation, to a scale of ¾ inch to a foot, of a 2½ inch framed, ledged, and braced door, 3 feet 6 inches by 8 feet 6 inches, hung in two heights, with fanlight over and solid deal wrought frame, and 1 inch tongued and beaded linings (wall, 11 inches).

12. Give an elevation and plan, scale ½ inch to a foot, of a six-panel door bolection moulded one side and moulded on other, giving detail of four joints of same (door 2¼ inches thick).

13. Give a drawing of a coach house door, 6 feet 6 inches by 8 feet, having a wicket door therein, 6 feet by 2 feet 6 inches. Show an elevation of the door, and dot on the framing, and state how you would hang the door.

14. Give plan and section, to the scale of ½ inch to a foot, of a dog legged staircase, showing rail, newels, etc., complete; the staircase to be 3 feet wide, with close string. Height, floor to floor, 11 feet; height to landing, 8 feet.

15. Give enlarged sketches of the "treads," "close string," etc.; also an enlarged sketch of the handrail and newel, and show how you would house and stop the handrail to newel.

16. Draw a detail plan, to the scale of 1 inch to the foot, of a Venetian frame, with double-hung sashes at side, the center ones being fixed, the opening to be 6 feet wide in reveal, the jambs splayed; also give a section through head and sill.

Honors Grade.

1. Give particulars of the following oaks, stating for what purposes they are best adapted, and how you would distinguish them: "Dantzic," "Italian," "White," "Riga."

2. Give some account of dry rot and the situations in which it is to be expected. What appearances would lead you to believe that dry rot exists in the timbers of a building? What is to be done when dry rot is discovered?

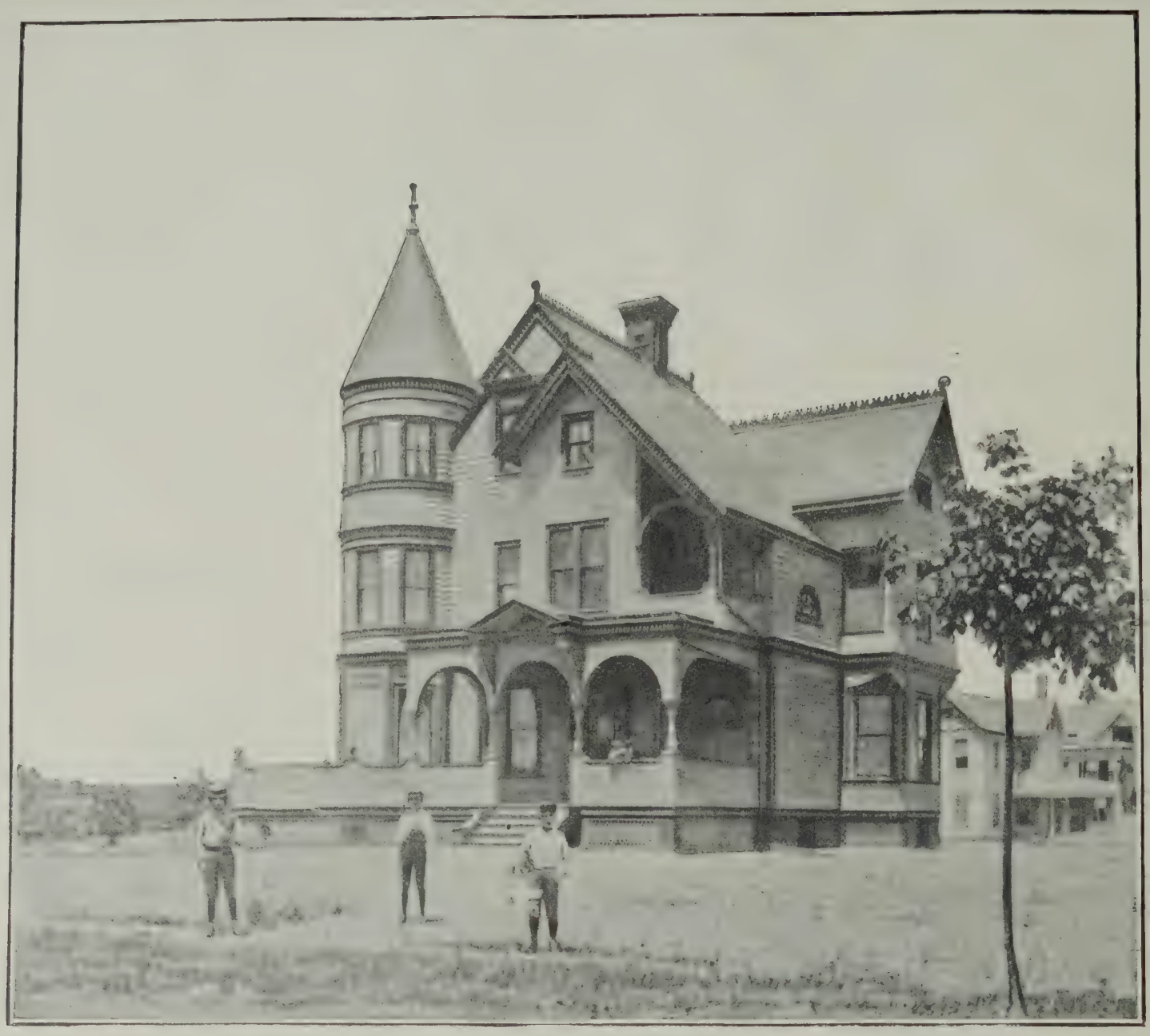
3. What woods would you select for use in a permanently wet situation, such as piling to a bridge pier? Give the names of those that are durable either in a wet or dry situation, but not in both.

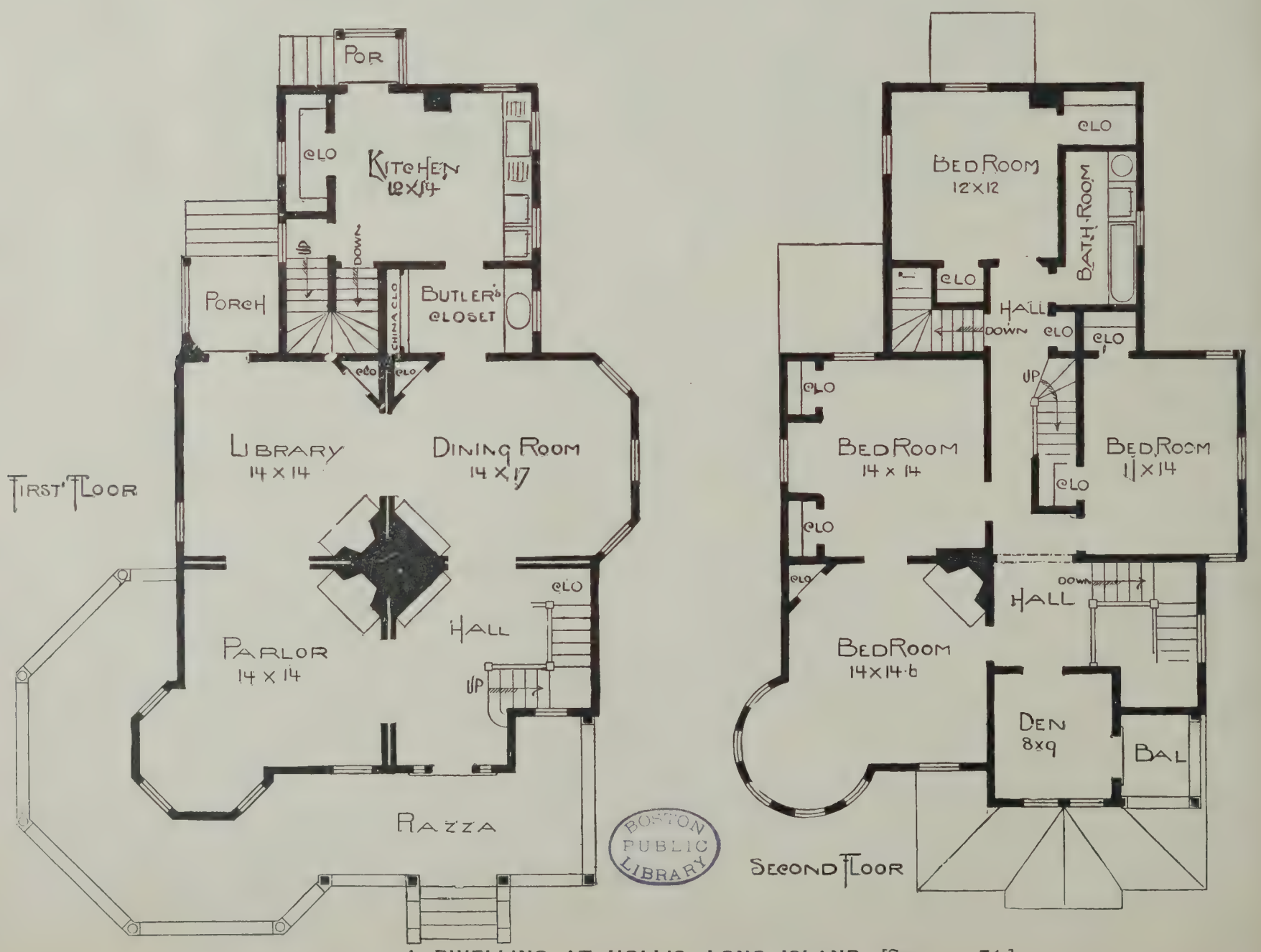
4. Give a sectional sketch, to the scale of 1 inch to the foot, of the lower part of a hammer beam truss, 30 feet span and 20 feet rise; dot on the joints and show the bolts and straps.

5. Give a drawing, ¼ inch scale to the foot, of a centering for an equilateral arch, 10 feet 6 inches high; width of opening, 12 feet; thickness of wall, 3 feet 4½ inches; also give enlarged sketch of joints and wedges.

6. What is the breaking weight of a beam of red

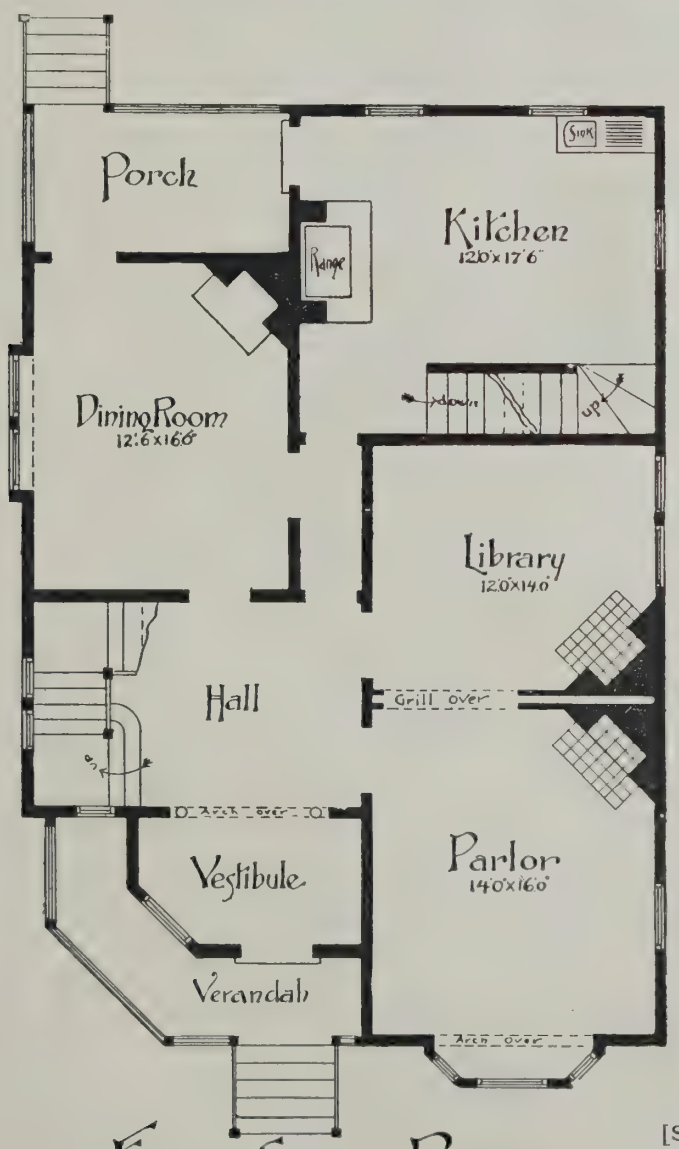
(*Continued on page 74.*)



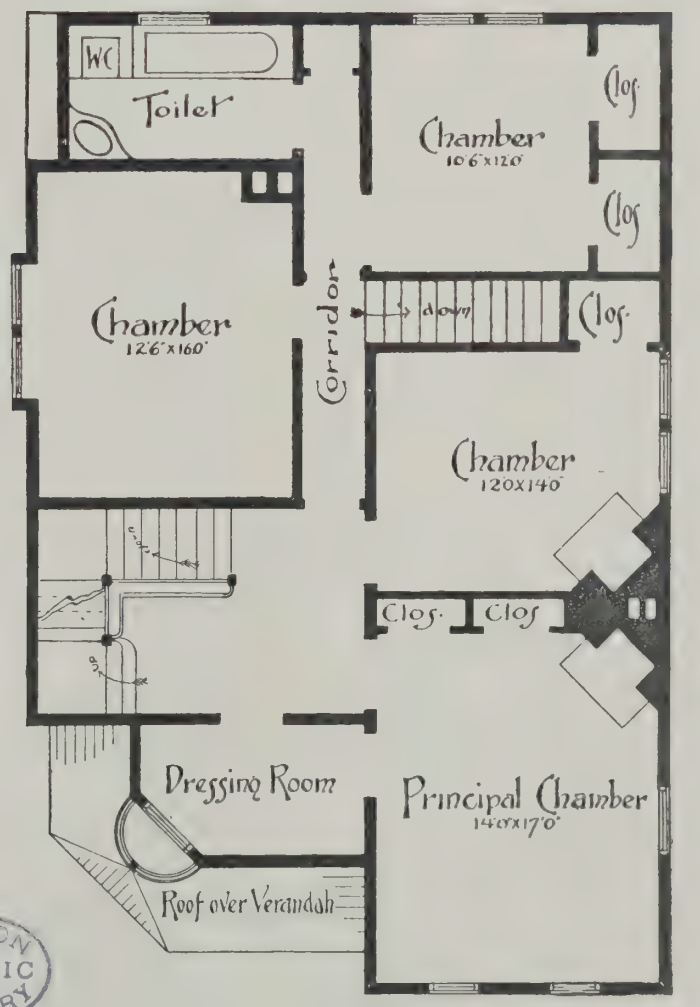


A DWELLING AT HOLLIS, LONG ISLAND.—[See page 71.]





First Story Plan.



Second Story Plan.

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[See page 71.]

Cottage, Humboldt Park, Chicago.

Cost, $3,200

(*Continued from page* 71.)

pine, whose depth is 10 inches and breadth 4 inches, over a clear opening of 10 feet, the ends of the beam being fixed and the load in the center?

7. The sectional area of a girder is 120 square inches. Give rules and show the working out of calculation of how you would determine the strongest and the stiffest beam from this section.

8. Give sketch, ¼ inch to the foot, with any enlarged details you may consider necessary, of how you would shore up the side of a house, 40 feet long and 45 feet high, which shows signs of bulging half way up.

9. It is required to roof a triangular building whose sides (internally) measure 60 feet, 40 feet and 50 feet, with a slate-hipped roof. Give plan and section, scale ⅛ inch to the foot, showing how you would construct the roof, and show on plan where the trusses should be and outline of their form.

10. Give a section, scale ¾ inch to a foot, through a wood entablature to a shop front, showing how you would frame the same and provide for sun-blind and revolving shutters.

11. Give plan and section, ½ inch to the foot scale, of a geometrical staircase, 3 feet 3 inches wide, in a hall, 7 feet 6 inches wide and 14 feet long, giving access to a doorway on the landing at a height of 8 feet from the floor, and also giving access to a door on the first floor 8 feet from end wall.

12. Show by detail drawings how you would set out the handrail and wreath to the well hole of the above.

13. Give a sketch, ½ inch to the foot scale, of a small bell turret to a roof of a school building, and show how you would frame it to the main roof.

14. It is required to frame a partition 11 feet high across a 17 feet opening, the partition to rest on 9 inch projecting piers; on either side there is to be a doorway, 7 feet 6 inches high, 3 feet 6 inches wide, 3 feet from wall, the partition to be framed to throw the weight on to the piers, and to take the joists of the floor above. Give sketch, to the scale of ⅜ inch to the foot, and make thereon the scantlings.

15. The moulded bars, 3 inches by 2 inches, of a skylight are required to intersect with a moulded ridge. Give sections of these and show the working of how you obtain the sections. The angle of skylight, 30 degrees.

BRICKWORK AND MASONRY.

Ordinary Grade. — Section I.

1. Give the names and describe the qualities of the different kinds of bricks in use in the district with which you are best acquainted.

2. Describe fully the principal points of superiority of a glazed pipe drain over a brick barrel drain.

3. Enumerate and describe, either in words or by sketches, the different kinds of bond used in brickwork.

4. It is directed in a specification that in building brick walls "every fourth course is to be grouted with liquid mortar." What are the reasons for this provision?

5. Draw a section (½ inch scale) of the lower part of the outside wall of the house having a dry area round it, showing the footings. Describe how you would keep the dry area free from wet, and properly ventilated.

6. Describe what is meant by "lap" and "gauge" in roof tiling. Illustrate your answer by rough sketches.

7. Explain the meaning of the following terms: Beam filling, parging, flaunching, chimney bar, hoop iron bond, wood brick, closer.

Section II.

8. What stone would you select for the following purposes? (1) For elaborate carving in the interior of a building; (2) for the nave piers of a church; (3) for external use in a smoky atmosphere. Give reasons for your answers.

9. Explain fully why, in building, stone should be laid on its natural bed.

10. What is meant by "hammer-faced," "close-picked," and "patent-axed" granite? Describe the tools with which the operations are performed.

11. Describe fully how you would insure the proper bonding of an uncoursed rubble wall.

12 Describe the best method of fixing iron railings to a stone coping.

13. Describe fully how you would set out the stone voussoirs of a round arch in ashlar of 5 feet 6 inches opening.

14. What precautions should be taken in preparing the mortar for ashlar work? Give your reasons.

Honors Grade.—Section I.

1. What are the principal causes, either in the material used or in the manufacture, affecting the color of bricks after burning?

2. Describe, and illustrate by sketches, how you would construct a fire-opening and chimney-breast on an upper floor in an internal wall with no fireplace under.

3. Calculate the number of bricks and the quantity of lime and sand used in an 18 inch wall, 90 feet long and 15 feet high, built in mortar, composed of one part gray stone lime and three of sand.

4. A tall chimney-shaft is to be erected, 120 feet high, lined with firebrick to a height of 40 feet. Draw a section through the lower 30 feet only of the wall (¼ inch scale), showing the thickness of the wall and the firebrick lining.

5. One end of a girder, carrying a total load of 120 tons, rests on a brick pier. What is the minimum area of the brick pier consistent with safety if built in mortar?

6. What are the principal advantages and drawbacks in the use of terra-cotta as a building material?

7. Explain fully what precautions you would consider necessary to take with the foundations of a large building to be erected on the side of a hill.

Section II.

8 Describe accurately the difference between boasted work, tooled work and stroked or striped work.

9. Describe in detail how you would set out a stone wall, the vertical face of which is to have a curved batter.

10. What proportions should be observed in ashlar masonry of Ancaster or Bath stone between the length, breadth and thickness of the individual stones?

11. What is meant by the *entasis* of a column? How would a mason prepare his moulds and templates for working this?

12. Draw a plan and section showing the corbeling of an oriel window in stone, projecting 2 feet 6 inches from the face of a stone wall.

13. What is a lierne rib? Describe generally the construction of fan vaulting.

14. Describe and illustrate what is meant by mouldings being on the chamfer plane.

PLUMBERS' WORK.

Ordinary Grade.

1. Under what circumstances, if any, would you dispense with traps to baths, sinks, lavatories, and water closets? What are the advantages of fixing traps to such appliances, and what should be the minimum depth of their water-seals?

2. Compare the merits of (*a*) valve closets, (*b*) washout closets, and (*c*) wash-down closets. Mention some of the advantages of closets of the pedestal form over closets with inclosures.

3. How would you make a double bend in the middle of a 10-feet length of 4-inch seamless lead soil-pipe, so as to insure every part of it being of equal thickness? How long would you take to make it, with the assistance of a mate, and what tools would you use?

4. State the quantity of tin required to be mixed with 1 cwt. pig lead for making respectively (*a*) plumbers' solder for wiping purposes, (*b*) fine solder for soldering brasswork to lead pipe with a copper bit, and (*c*) fine solder for blowpipe work, and state the melting points of lead and tin.

5. A house is supplied with its drinking water from a deep well, in the vicinity of which it is necessary to lay a soil drain. How would you construct the drain, and how close to the well would you lay it?

6. What advantages are gained by keeping the waste-pipes of baths, draw-off sinks and lavatories separate from soil-pipes? Give a diagram showing how you would disconnect such pipes from the soil-drain.

7. What are the principal points to be observed in determining the position of the outlet of a ventilation pipe from a soil-pipe or drain?

8. A 16-inch wash-basin, with plug and washer, is required to be fixed on each of the ground, first and second floors of a house, the basins being one over the other. Describe and give the sizes of the plugs, traps, overflows, waste and ventilation pipes you would fix, and show by a diagram the basins in position, and how you would arrange the traps, overflows and pipes, omitting the services.

9. In the case of a house where there is constant supply of pure water, would you lay on the service to the drinking water draw-off cocks directly from the rising main or from a cistern? Give reasons.

10. What important points should be borne in mind in planning the rolls and drips of a flat to be covered with lead? State (*a*) the least fall that should be given to a flat, (*b*) the direction in which the boards should be laid, (*c*) the greatest length from drip to drip, (*d*) the depth of a drip, and (*e*) the weight per superficial foot of the lead that you would use for a flat and its flashing.

11. Sketch a vertical section of two pieces of 4-inch 8-lb. lead soil-pipe connected by a wiped soldered joint, and figure the thickness of the solder in the center of the joint. State the length such joints should be made respectively on soil-pipes and waste-pipes from 1¼-inch to 4-inch bore.

Honors Grade.

1. In a four-storied house, with water closets and baths on each of the two upper floors, how would you arrange for storing about 600 gallons of water, to be supplied intermittently from a water company's main, for a daily consumption of about two-thirds of this quantity, and how would you arrange for the filtration of about 30 gallons of the water daily, and for laying on a service of filtered water to sinks on the second and third floors, for filling the bedroom water-bottles, and to draw-off cocks in the butler's pantry and scullery? Give a diagram showing the cistern arrangements complete, and describe and state the sizes of the rising main and the ball valve you would fix, there being a pressure of about 5 lb. per square inch on the latter. Describe and sketch a section of the filter you would prefer to fix, and give reasons for your selection, and state the kind of pipe you would fix for the filtered water supply.

2. What advantages are gained by laying all the drains of a house outside its external walls? In the case of a terrace-house, where the drains must necessarily be laid through its interior, describe and state the size of the main drain you would lay to take the discharges from two stacks of soil-pipe, with two water closets on each, the wastes from two baths, two lavatories, two slop sinks, two draw-off sinks, and the scullery sinks; and the rain water and surface water from the roof and areas, equal in area to about 3,000 super. feet; describe and give sketches showing how you would make the joints of the drain, how you would connect the soil-pipes to the drain, and how you would disconnect the drain from the sewer and provide for its efficient ventilation.

3. Why do some waters act more on lead than others? How would you ascertain the presence of lead in a water? If the water supplied to a house were found to act much on lead, describe the cistern and pipes you would recommend to be fixed for storing and supplying the water for potable purposes.

4. Two sloping sides of a high pitched roof, measuring about 50 feet from ridge to gutter, are to be covered with 8 lb. milled lead. (*a*) How many pieces of lead would you put in a bay between the ridge and gutter? (*b*) How far apart would you place the rolls, and what should be their size? (*c*) How would you secure the lead in its position? and (*d*) which do you consider would make the most durable job—a wood or a seam roll? Sketch a section through three bays with wood rolls and seam rolls respectively, showing one roll completed and one roll with the undercloak finished and the overcloak ready for dressing over. Also give sections through the ridge showing how you would treat it in the case of seam rolls and wood rolls respectively.

5. What methods would you adopt for testing the drains of a house so as to be quite sure that all and every part of them would be under the test, and how would you ascertain the condition of all the soil pipes and waste pipes, and their connections with the drains?

6. A range of ten lavatory basins, with 1¼ in. clear-way plugs and washers, is to be fixed in a lavatory room adjoining a dormitory on the second and third floors respectively of a three-storied building, and a bath is to be fixed in a bath room at each end of each lavatory room. Describe and give the sizes of the traps and waste pipes you would fix, and give a diagram showing the basins, baths, traps, waste pipes, overflow pipes and ventilation pipes complete, omitting the services.

7. Explain the uses and advantages of soakers for gables, chimneys, and projections through roofs. Give the sizes, weight of lead per superficial foot, and the number of soakers that would be required for two gables respectively, the roof in each case measuring 20 feet from ridge to eaves, and to be covered in one case with slates 20 inches by 10 inches, with a 2½ inch lap, and in the other case with tiles 10½ inches by 7 inches, with a three inch lap.

8. State the sizes of the rising main and ball valve you would fix for supplying three cisterns, each 6 feet by 3 feet by 3 feet deep, situated in a cistern room about 35 feet above the street main, upon which there is a pressure of 70 feet head of water, the supply being almost constant. Show by rough sketches how you would connect the three cisterns together, figure in the sizes of the connections and the overflow or waste pipe, and show the relative positions of the overflow and ball valve. Describe how you would treat the whole arrangement to prevent damage by frost.

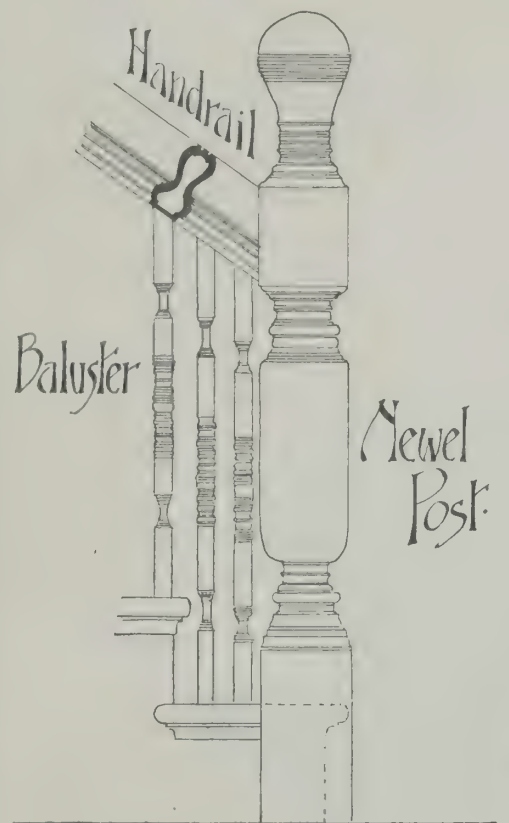
9. A valve closet is to be fixed on each of the three floors of a house, and for certain reasons the soil pipe must be fixed internally. Describe and give a diagram showing the closets, traps, and pipes complete, omitting the services.

10. In the case of a house with only a few years of its lease to run, how would you test an old soldered seam lead soil pipe, fixed internally, and satisfy yourself as to its fitness to remain? How would you ascertain the condition of the branches and traps? and supposing the latter were of the round pipe "P" or "half S" form, how would you test their water seals against the actions of momentum and momentum and siphonage combined? or if "D" traps were found under the closets, would you allow them to remain until the expiration of the lease, or replace them by others of a better kind?

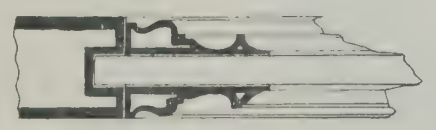
SEE that the private drains from closets and sinks are properly trapped, in order that the poisonous gases from the sewers may not get into the house.

[See page 70.]

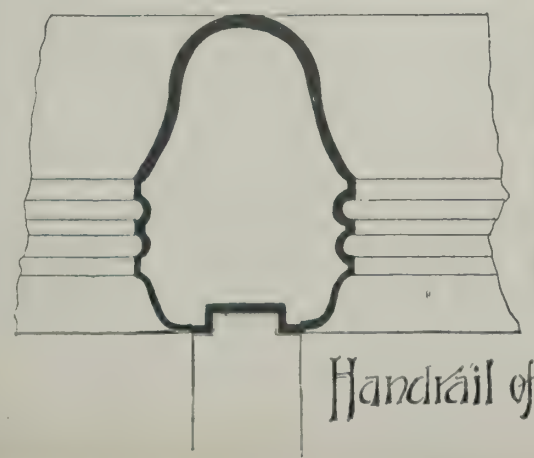
A Modern Dwelling in the West End of Chicago, Ill.



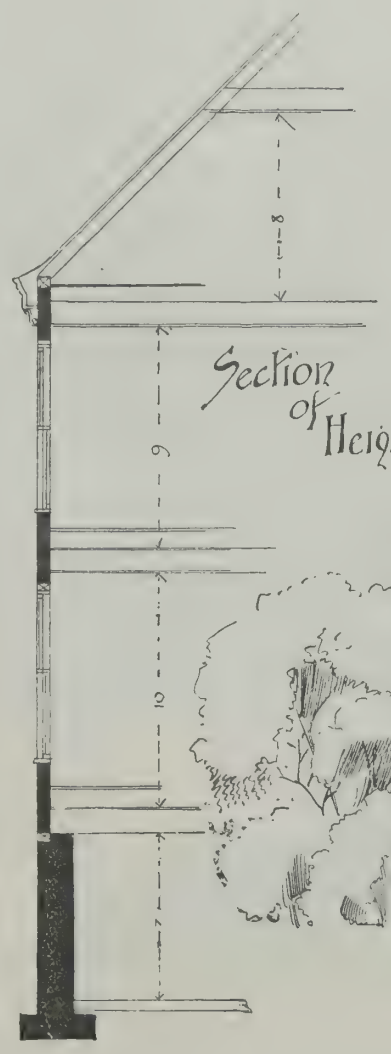
Staircase



Section of Doors.

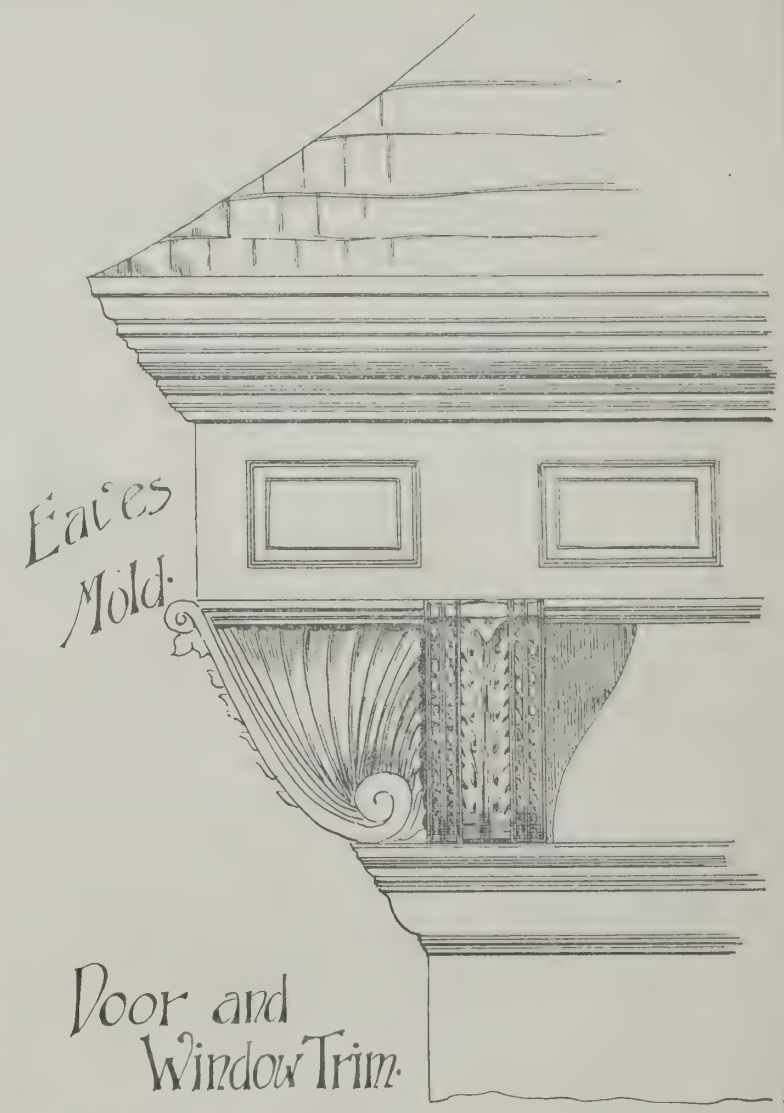


Handrail of Piazza.

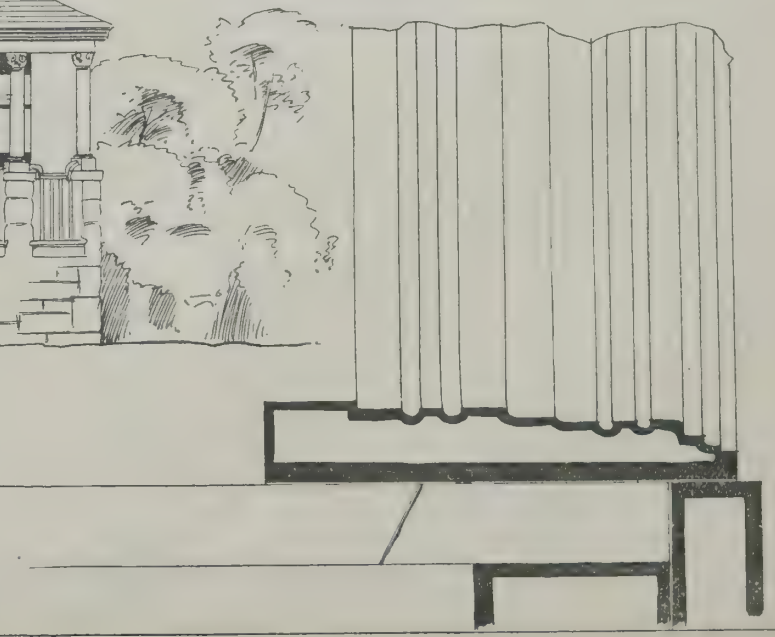


Section of Heights.

Front Elevation.

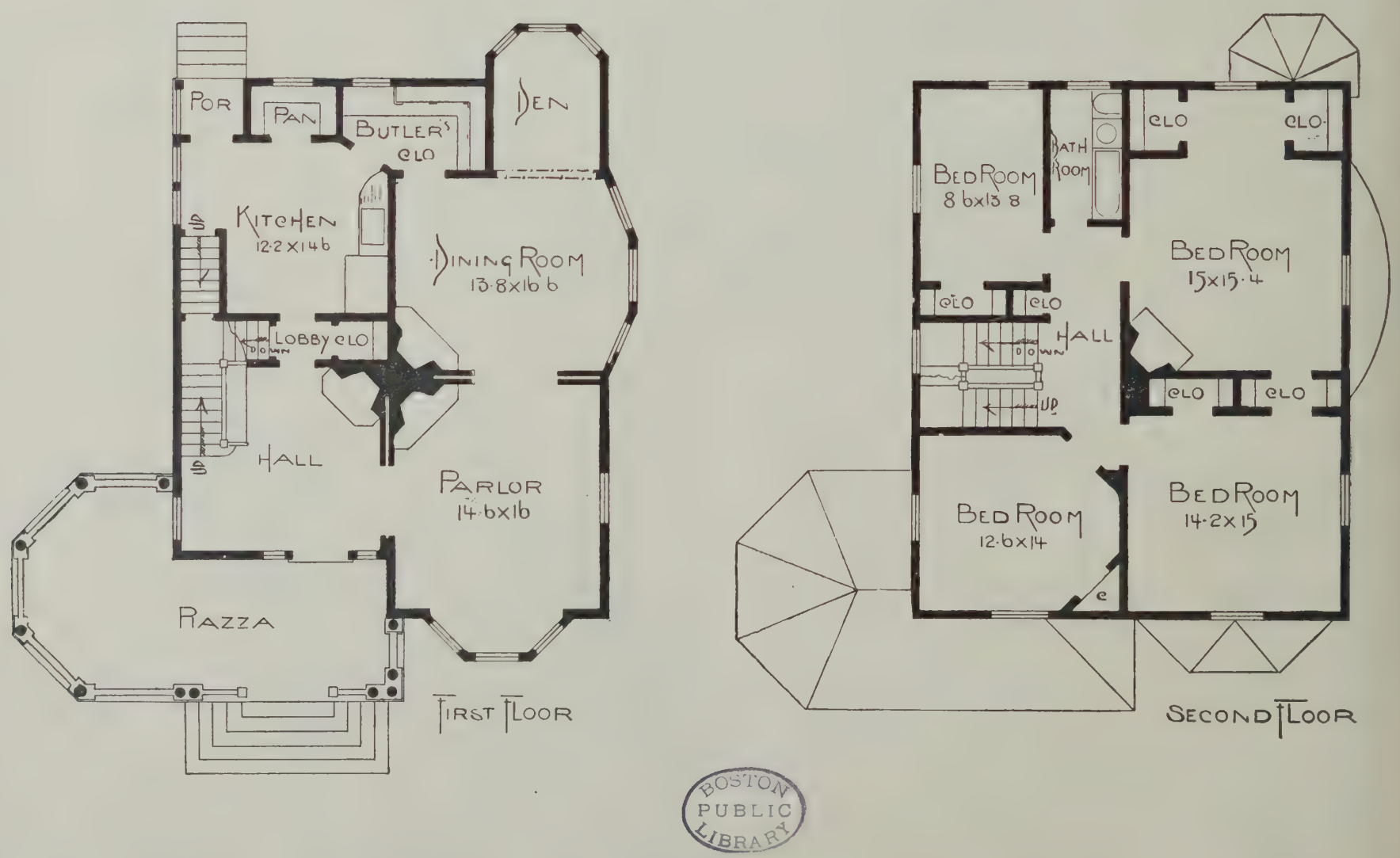


Door and Window Trim.



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A RESIDENCE NEAR NEW YORK.—[See page 71.]

A MODERN DWELLING IN THE WEST END OF CHICAGO.



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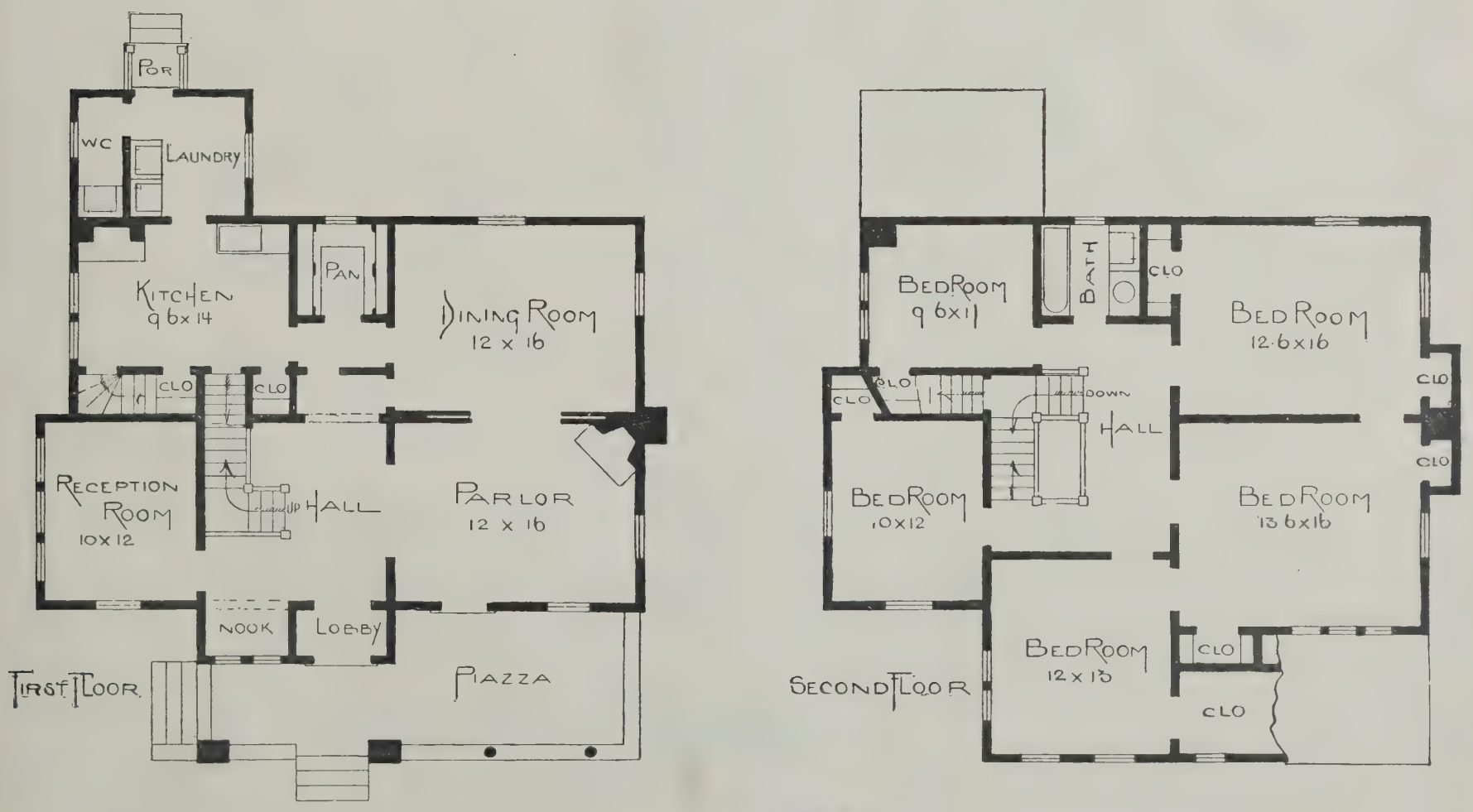
A FOURTEEN HUNDRED DOLLAR COTTAGE AT CHICAGO.



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SCHUMACHER & ETTLINGER, NEW YORK.





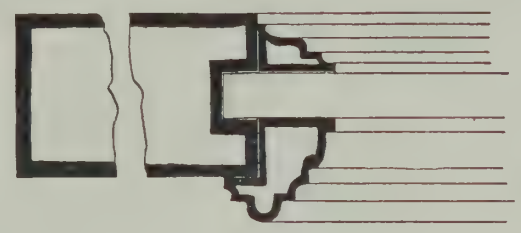
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A FLEMISH COTTAGE.—[See page 79.]

A FOURTEEN HUNDRED DOLLAR COTTAGE AT CHICAGO, ILL.

[See page 70.]

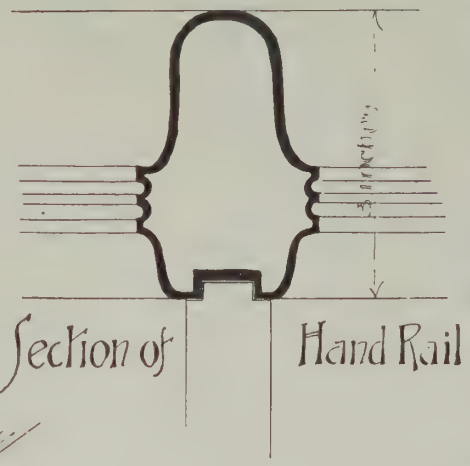
Section through Front Door



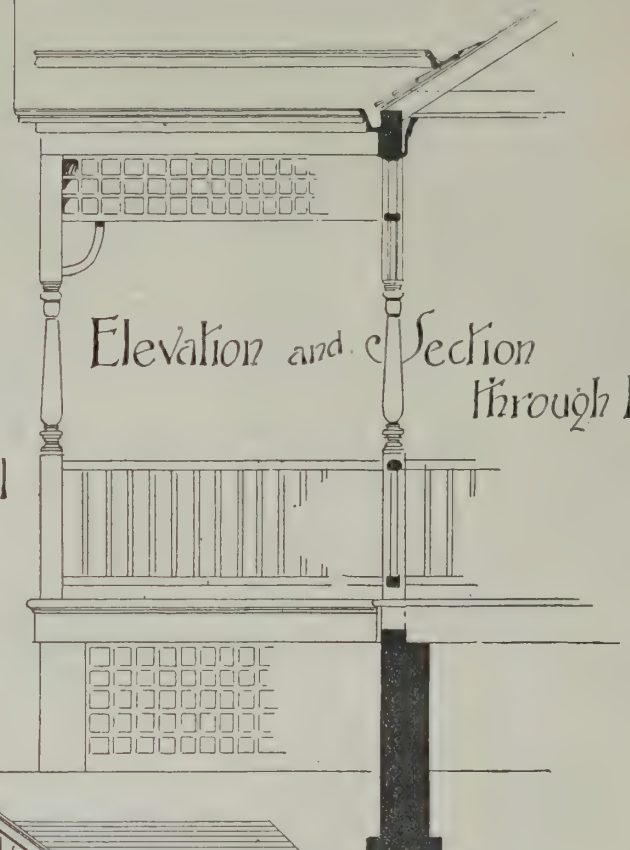


Eaves Gutter

Section of Heights



Section of Hand Rail



Elevation and Section through Porch



Front Elevation.



Side Elevation.

Scale of feet

A COTTAGE AT ORANGE, N. J.

We present, on page 81, a house erected for Mr. Andre Causse, at South Orange, N. J. Charles B. Atwood, New York, architect. Dimensions: Front, 51 ft.; side, 46 ft., not including piazza. Underpinning of dark red sandstone, "quarry faced." Exterior covered with shingles, and painted colonial yellow, with white trimmings. Hall trimmed with antique oak, has a paneled wainscoting 8 ft. high, an ornamental staircase, with a window at side, glazed with tinted glass, and a brick fireplace, provided with an oak mantel, etc. Library trimmed with cherry, dining room with oak, and all other rooms with white pine, finished natural, with the exception of drawing room, which is finished in cream and gold. Floors of hard wood, laid in narrow widths. Butler's pantry is furnished with a dumb waiter, bowl, shelves, drawers, cupboards, etc. Basement contains kitchen, pantries, laundry, furnace, and other cellars. There are three bed rooms, den, and bath room on second floor, and four bed rooms on third floor. Bath room is wainscoted and fitted up in the usual manner. Cost, $13,000, complete.

Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

A FLEMISH COTTAGE.

Our engraving on page 77 shows a cottage, Flemish in treatment, erected in the Pilla Park property, owned by George W. Childs, Esq., at Wayne, Pa. F. L. & W. L. Price, Philadelphia, Pa., architects. Dimensions: Front, 40 ft.; side, 38 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft. Underpinning and balustrade to piazza are built of field stone laid at random. Exterior wall to reception room is covered with stucco work. The rest of the building is shingled and painted colonial yellow, with bottle green trimmings. Roof shingled, painted red. First floor trimmed with whitewood, stained and finished in oak. Second floor trimmed with white pine, finished natural. Floors of yellow pine, laid in narrow widths. Hall spacious, contains an ornamental staircase of oak, nook with stained glass windows, lobby, etc. Parlor and dining room are connected by double sliding doors, the former having an open fireplace with tiled hearth and oak mantel. Kitchen, pantries, and laundry are wainscoted and trimmed with yellow pine, finished with hard oil, and are replete with all the necessary appointments. Second floor contains four bed rooms, with large closets, and bath room, the latter wainscoted. Two bed rooms and store room in attic. Cellar cemented; contains furnace. Cost, $5,800, complete, including furnace, range, grading, gas, electric bells, etc. Wendell & Smith, of Wayne, Pa., builders.

Our engraving was made directly from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A PENNSYLVANIA RESIDENCE.

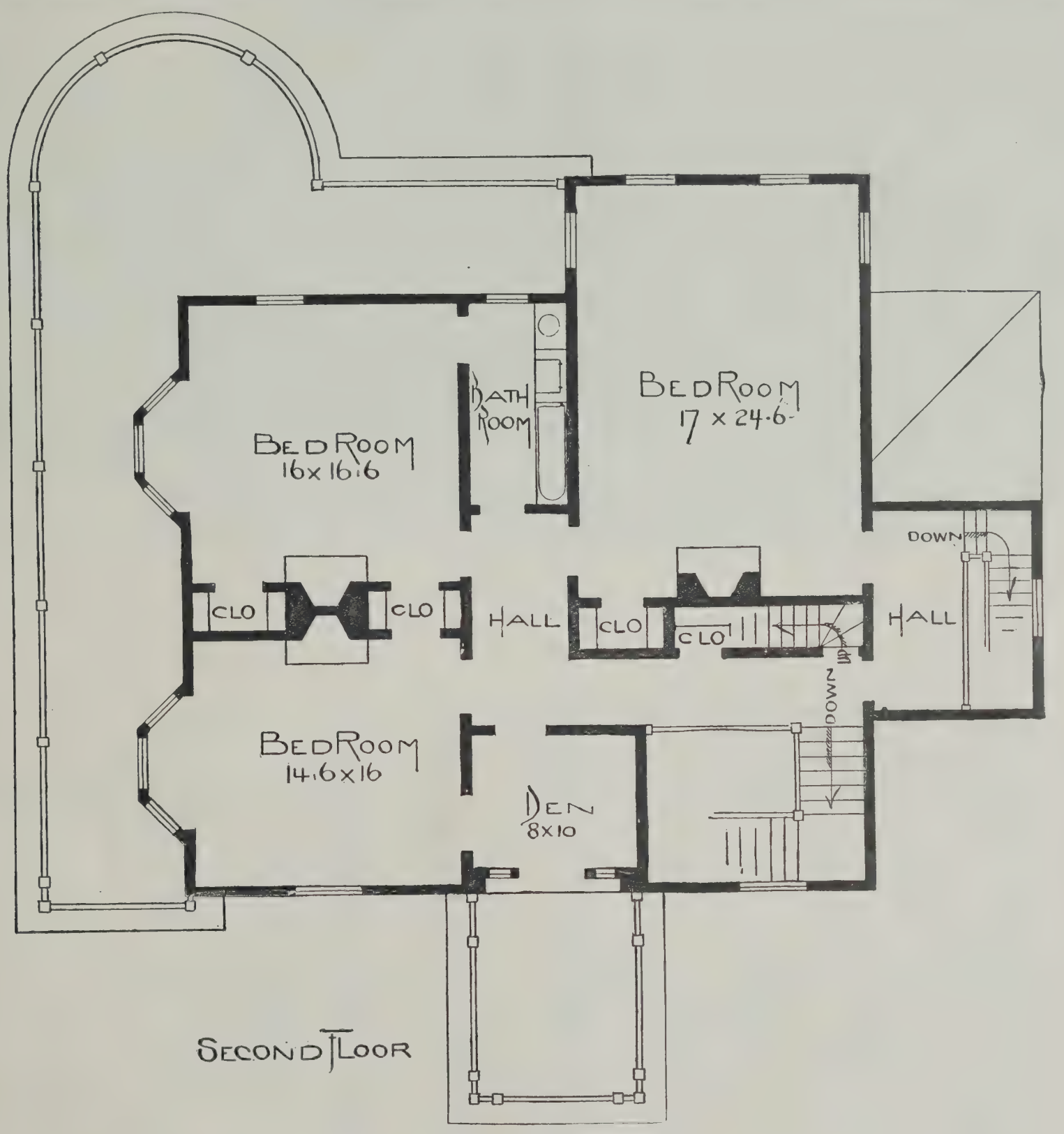
We present on page 80, a house erected at Elm Station, Montgomery Co., Pa., by Mr. C. W. Macfarlane, the architect. Dimensions: Front, 33 ft.; side, 47 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. This house is distinctly colonial in treatment, and has many pleasing features. First story of field stone, laid at random; second story shingled and painted colonial yellow, with white trimmings. Roof shingled and painted red. One of the attractive features is the arcaded effect between library and hall; the latter containing an ornamental staircase, with cherry columns running to ceiling. Staircase and hall lighted by stained glass window. The quaint effect of the interior is heightened by being painted old ivory white (china glass) with a little gilt, with the exception of dining room, which is trimmed with oak. Fireplaces have tiled hearths and mantels to correspond with trim. Floors of hard wood. Kitchen, laundry, and pantries are trimmed and wainscoted with North Carolina pine, and furnished complete. There are five bed rooms and bath room on second floor, and four rooms on third floor. Bath room is wainscoted and furnished in the usual manner. Cemented cellar contains a furnace supplied with outside air. Cost, $5,200.

Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

BLOCK OF CHEAP BRICK HOUSES AT PHILADELPHIA, PA.

Our engraving, on page 82, shows a block of economical brick houses, erected for Mr. Thomas Marshall, at Philadelphia, Pa. Dimensions: Width, 18 ft.; depth, 50 ft. 8 in., not including front porch. Height of ceiling: first story, 9 ft.; second, 8 ft. 6 in. Foundation, stone. Underpinning, first and second stories are built of pressed brick with brownstone trimmings. Woodwork to porch is painted bottle green. Roof slopes to rear, and is covered with good quality tin. The plans are excellent. Trim throughout is of white pine, grained in imitation of oak. Hall contains an ornamental staircase of ash. Fireplace in parlor is furnished with a slate mantel. Kitchen is wainscoted and fitted up complete with pantry, sink, etc. Second floor contains four bed rooms and bath room all fitted up in the usual manner. Cemented cellar under whole of house is furnished with a furnace and coal cellar. Cost, $2,000 apiece. J. M. Stitler, of Philadelphia, architect.

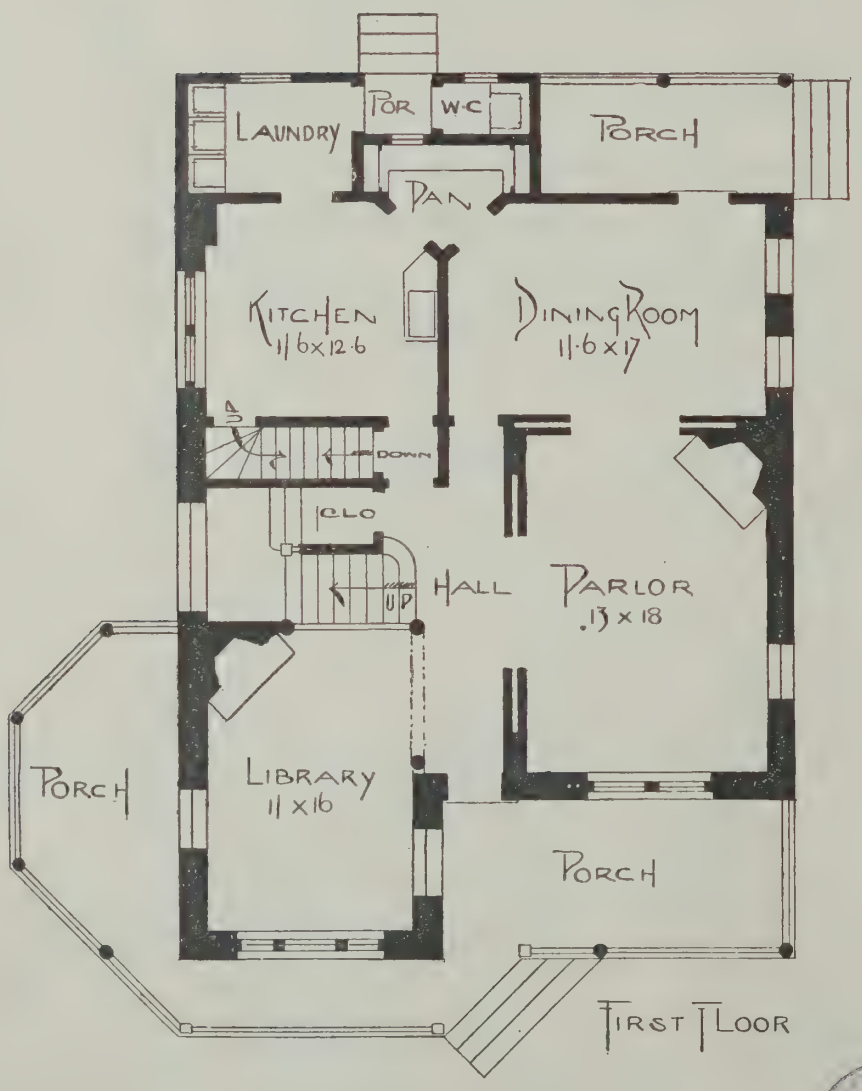
Our engraving was made direct from a photograph of the buildings taken especially for the SCIENTIFIC AMERICAN.



A COTTAGE AT ORANGE, N. J.

SEE that there is no connection between the water cistern and the drain, and that the waste goes to the outside of the house.

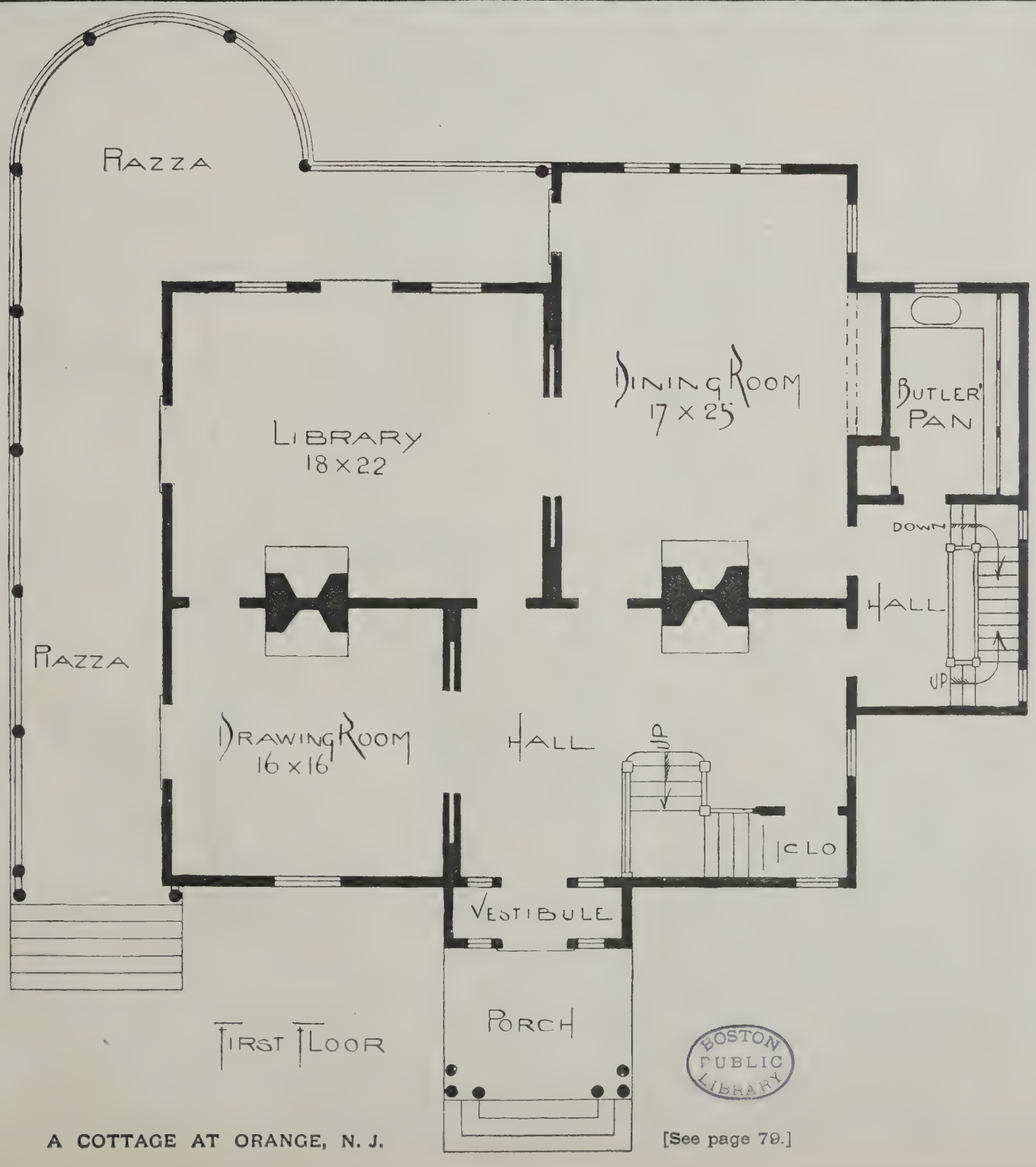






A PENNSYLVANIA RESIDENCE.—[See page 79.]



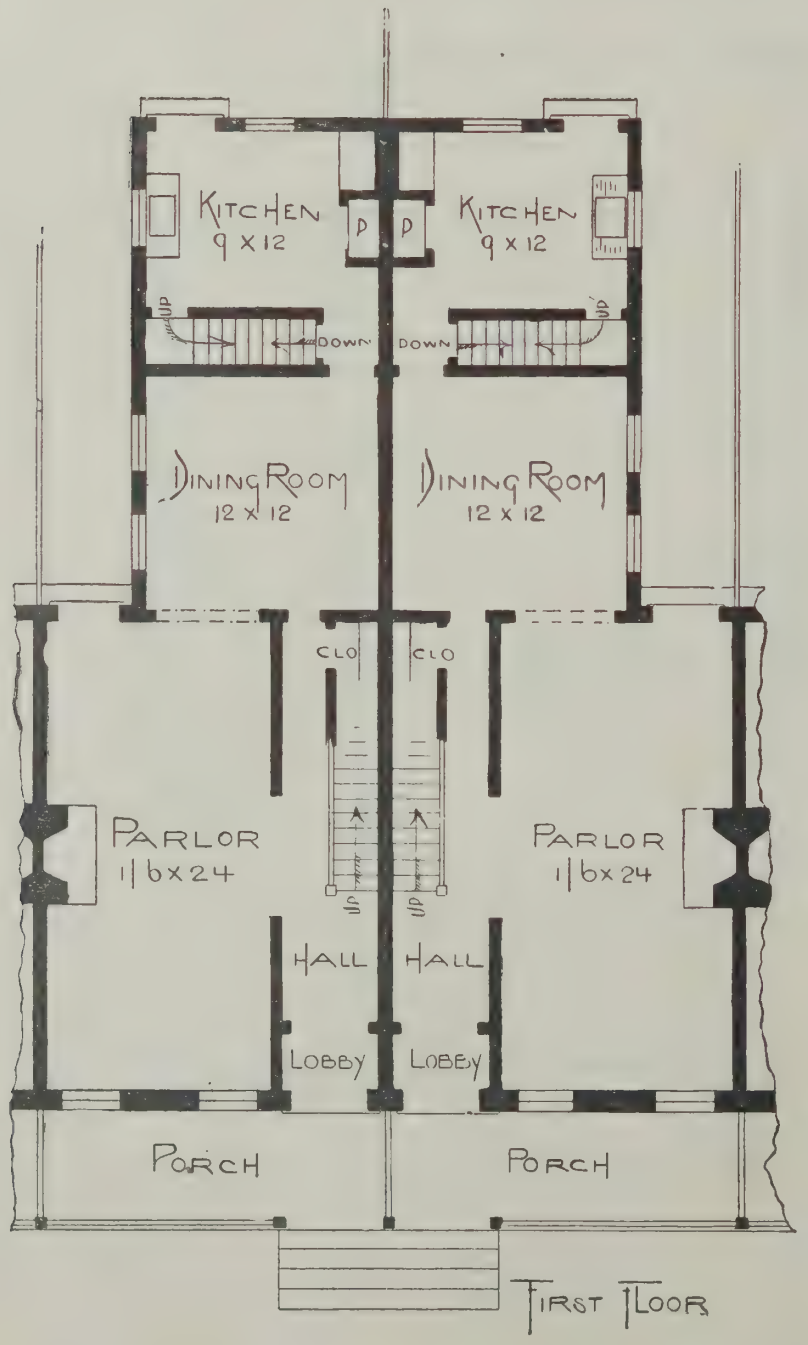


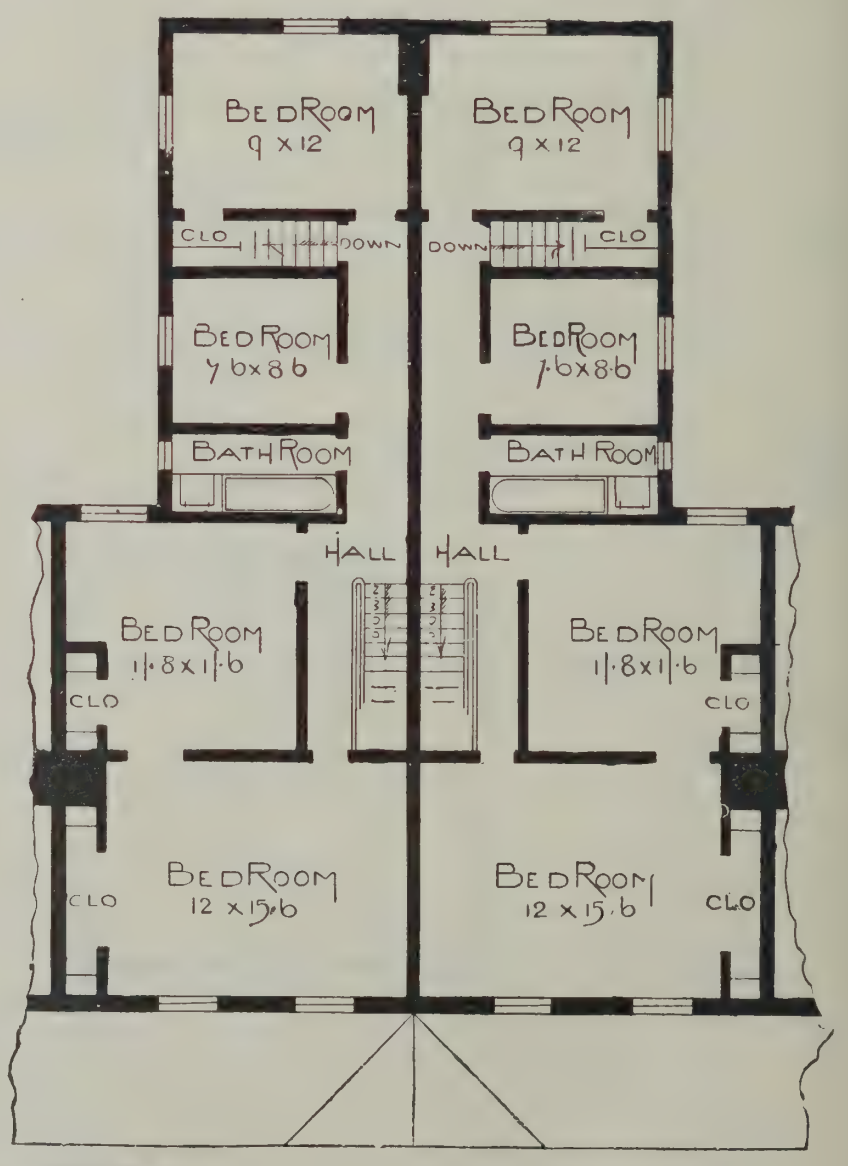
A COTTAGE AT ORANGE, N. J.

[See page 79.]

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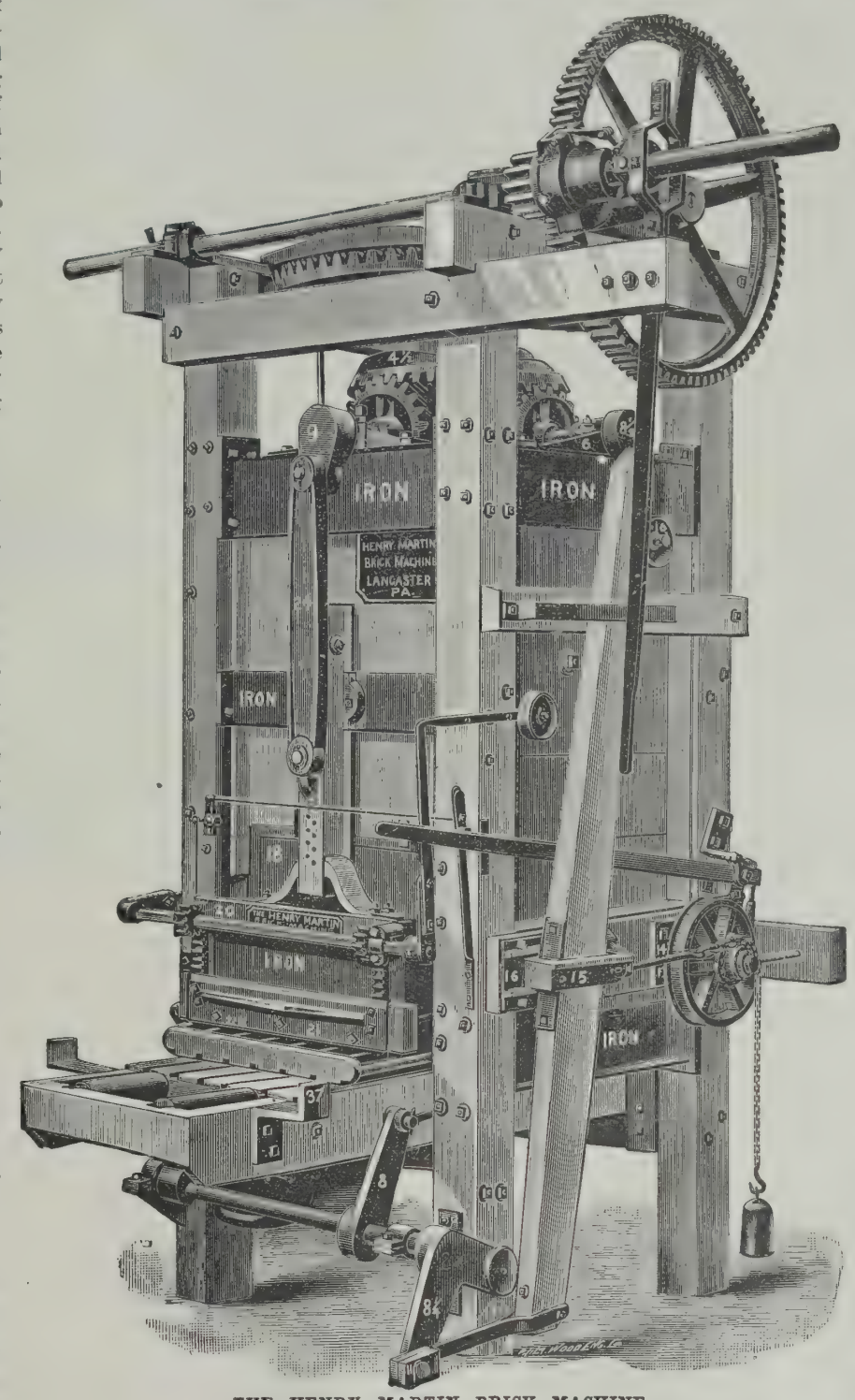




PHILADELPHIA BRICK HOUSES OF MODERATE COST.—See page 79.]

THE HENRY MARTIN BRICK MACHINE.

The machine shown in the accompanying illustration is simple in its construction and does not require skilled labor to operate it. Its rails are all iron, making a very strong machine, not liable to break down or get out of order. It is adapted to every variety of clay, and designed to make good merchantable brick from any clay that will admit of being worked by hand, grinding and tempering its own clay by means of wrought iron knives. It is automatic in its action, and the moulds being dusted with fine, sharp sand before being placed in the machine, the clay does not stick to them, and the brick are freely delivered. The machine is constructed especially with the view of turning out the finest work possible, and is now in use in every part of the country and Canada. Parties desiring further information should write for illustrated catalogue to the Henry Martin Brick Machine Manufacturing Co., Lancaster, Pa.



THE HENRY MARTIN BRICK MACHINE.

"Buckeye Portland Cement."

The above is the title of an extremely neat and valuable pamphlet just issued by the Buckeye Portland Cement Co., of Bellefontaine, Ohio. The information contained therein relative to hydraulic cement, natural cement, and Portland cement, its manufacture and mixing, with tests of strength, the making of concrete, and making cement walks, including points as to the relative strength and cost of cement mortars, is of the highest interest to all engaged in building operations. Architects and builders will do well to send to the company for a copy of this most excellently gotten up little treatise.

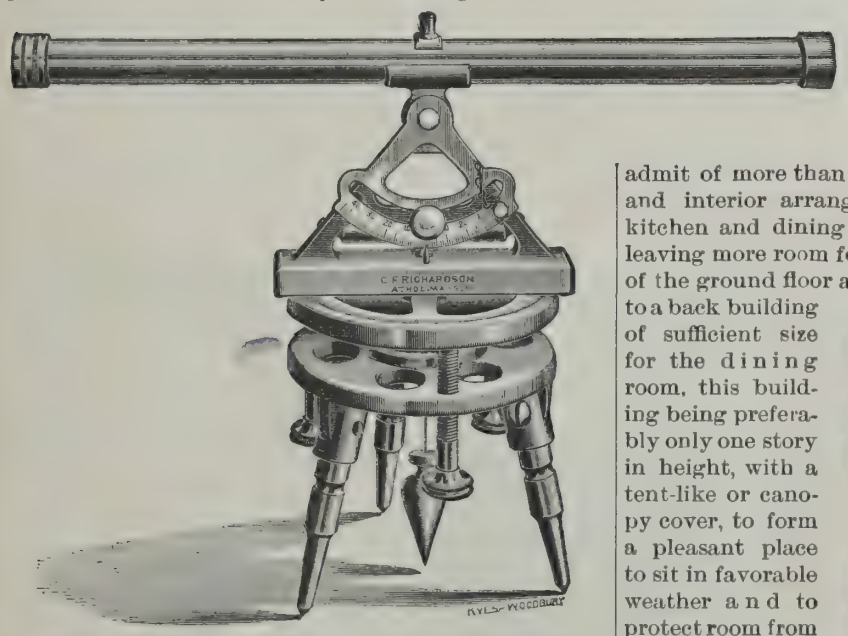
A Government Contract for Woodworking Machinery.

The Navy Department of the United States has recently awarded the contract to furnish the woodworking machinery required in the navy yard at Norfolk, Va., to the Egan Company, of Cincinnati, Ohio. Among the machines ordered is a complete outfit of planing, sash, door and blind machines. Preference is said to have been given to them on account of the late improvements, through which better and faster work is made.

ARCHITECT'S AND CARPENTER'S TRANSIT.

This instrument, which is manufactured by C. F. Richardson, of Athol, Mass., is designed to meet the wants of architects, carpenters, masons, builders, and others, who, in their work, need the use of a level and some instrument for the taking of angles, but do not feel like paying the price charged for a surveyor's or engineer's transit.

This instrument consists of a tripod, to the head of which is connected, by a ball and socket joint, an upper plate which can be leveled by the leveling screws. The

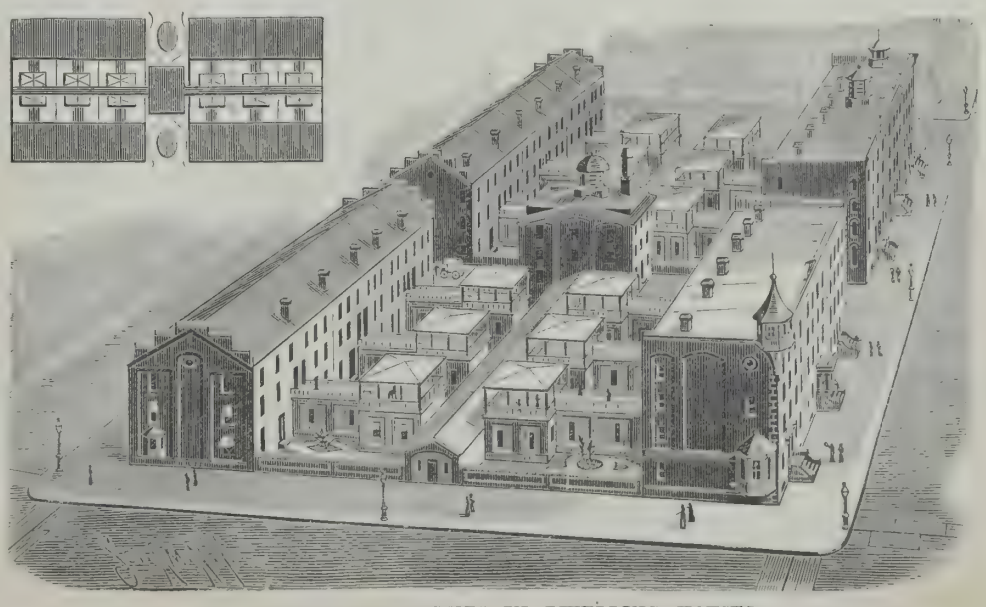


RICHARDSON'S ARCHITECT'S AND CARPENTER'S TRANSIT.

plate is recessed to contain a graduated arc for taking angles. On this plate rests a triangular frame to which is attached a level, a graduated arc for taking vertical angles, and a sight tube of brass twelve inches long. With the short legs, as shown in the cut, the transit is eight inches high. With long extension legs which fasten over the short ones, the height can be from two feet eight inches to four feet eight inches. These transits are well made, and are giving good satisfaction.

IMPROVED DWELLING HOUSES.

The illustration represents a model plan, recently patented by Mr. Leonard E. Ladd, of No. 2144 Mount Vernon Street, Philadelphia, for the building of improved dwelling houses. The plan provides for the erection of a block of buildings, and their connection in such way that the ordinary kitchen work and general supply features will all be cared for in one central building, the illustration showing twenty four houses laid out after such a scheme, although the system would be equally applicable to at least as many as forty houses. As the average distance through the supply hall for forty houses 18 feet front would only be about 90 feet, the houses proper would admit of more than the usual variety of construction and interior arrangement, from the fact that the kitchen and dining room would not be in them, thus leaving more room for other purposes. From the rear of the ground floor a covered passageway or hall leads to a back building of sufficient size for the dining room, this building being preferably only one story in height, with a tent-like or canopy cover, to form a pleasant place to sit in favorable weather and to protect room from heat of the sun. From the dining rooms of all the buildings in the block a covered passageway or general supply hall extends to a central building, to be used as a common supply building, laundry, and kitchen, and fitted up with appliances for furnishing light and heat, room for servants' quarters, etc. When electric light is used, the dynamos would be located in this building, as also the plant for supplying heat, and the blowers for artificial ventilation, and cold storage, if this was desired. This central building would preferably be connected with each of the houses in the block by a speaking tube or by telephone, whereby the housekeeper could order supplies in advance for each successive meal, the superintendent of the general supply building thus having the opportunity to buy in larger quantities, and better suit individual tastes, according to the larger number to be served. Not only would all the food thus be served without the smell of cooking in the house, and the dishes removed, but there would be no laundry work in the house, no stocking of coal bins, and no care of furnaces, and the many other cares incident to ordinary housekeeping, but the readiness of service, under proper regulation, would be vastly superior to that at present realized in most of what may be styled the "best regulated families." The plan of heating is far superior to covering the pipes in the ground, and the distance to carry it will be so short, all condensed steam can return to the boiler hot (if heated with steam), which will be a great saving.



LADD'S IMPROVEMENTS IN DWELLING HOUSES.

Dumb Waiter and Hand Power Elevators.

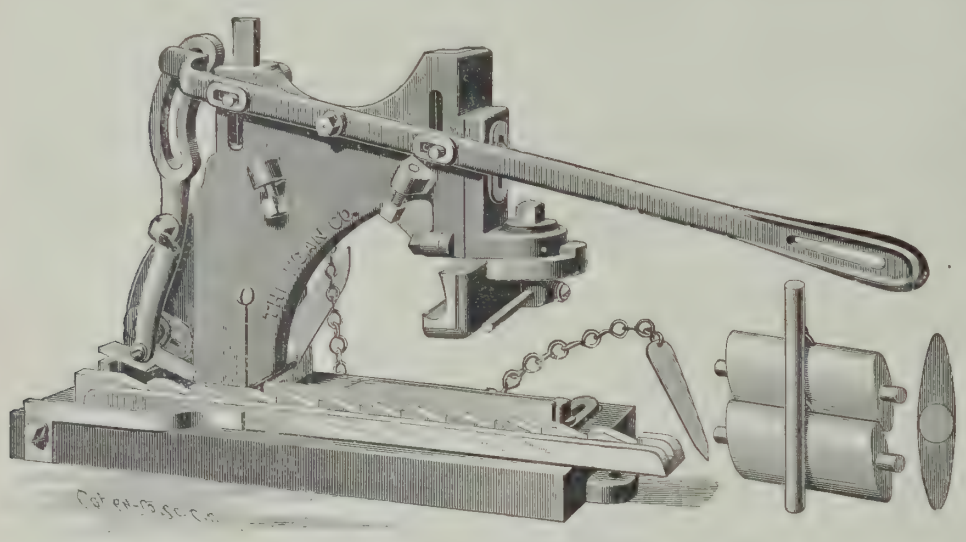
As inventors and makers of this class of contrivances, the Storm Manufacturing Co., of Newark, N. J., stands high. Their improved dumb waiter, styled the "New York Safety," was put on the market about three years ago and at once became a favorite. This device is noiseless, and moves with perfect ease, so that a child of ten years can operate it. It lifts easily from 50 to 75 lb. The ropes are always tight, the counterpoise weight being attached in such a manner as to allow for either stretching or shrinkage. It is provided with a safety rope, for preventing accident, in case the hoisting rope breaks after long use. It runs closer to the ceiling and nearer to the floor than any waiter in the market. It is provided with a grip in order that the car, when loaded beyond balance, may be held at any desired point. It can easily be set up by any mechanic, with the aid of the instructions and diagrams furnished by the company.

For places where it is desired to have appliances capable of lifting more weight, the company makes several hoisting outfits, on the same principle as the New York Safety. Such are the Manhattan dumb waiter with a capacity of 200 lb., the improved Humphrey hand elevator with a capacity of 500 lb., and another one with a capacity of 750 lb. The Manhattan is especially intended for use in tenement and apartment houses, and for light work in factories, such as boots and shoes, hats, paper boxes, straw goods, etc.

The dumb waiters and elevators made by the Storm Manufacturing Company are in use in thousands of high class structures in the United States and Canada. Among them may be mentioned: The Hudson River State Hospital, at Poughkeepsie, N. Y.; the Middletown Insane Asylum, at Middletown, N. Y.; the factories of the Edison Company, at Harrison, N. J.; United States Military Academy, West Point, N. Y.; and Rutgers College, New Brunswick, N. J.

IMPROVED DOUBLE BLIND WIRING MACHINE.

The accompanying illustration represents one of the newest mechanisms whereby work may be lessened and time saved, being a wiring machine for blinds, now being introduced by the Egan Company, of Cincinnati, O. It is simple and easy to operate, and one full stroke of the lever will drive a staple into the slat and connect it to the rod. This is done without turning the slat, and is a great saving of time and patience. One great advantage over all others is the ingenious contrivance to prevent the splitting of the slat or rod when driving the staple, as is common in the machines now used. Each driver is provided with a cut-off, making it impossible for more than one staple to pass to the groove at one time. The staple is held in position in the groove by an ingenious device until forced out by the driver, thus insuring perfectly straight driving and reliable work. The bottom plate is provided with an adjustable rack fence or guide, also an arrangement whereby the stroke of the feed can be changed instantly to suit the different racks. A neat knife stringer for arranging staples is attached to the machine by a chain, so that it is at all times convenient. All wearing parts are made of steel and hardened, and the machine is provided with the necessary adjustments, making a first class, reliable machine.

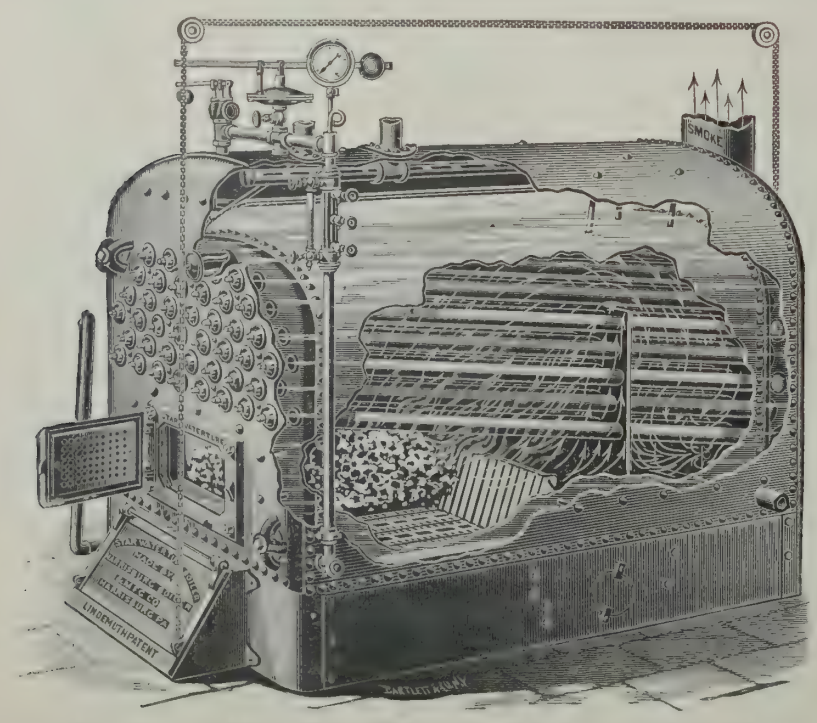


THE EGAN CO. DOUBLE BLIND WIRING MACHINE.

For further information address the Egan Company, Nos. 209 to 229 West Front Street, Cincinnati, Ohio, U. S. A.

AN IMPROVED BOILER FOR POWER AND HEATING.

The illustration represents one of several styles of boilers manufactured by the Harrisburg Boiler and Manufacturing Co., successors to the Star Steam Heater Co., of Harrisburg, Pa. These boilers are self-contained, do not require any brick setting, and afford a large amount of actual heating surface. The arrangement of the deflecting plates through which the tubes pass is such that the outside of the tubes is subjected to the heat in an unusual degree, the fire passing around the tubes two or three times during its progress from the fire box to the smoke flue. The boilers are made of the best homogeneous steel, with flanged steel heads, except when the buyer prefers iron, when C. H. No. 1 is used. For power purposes extra heavy material and double-stay bolts are used throughout. The company do a general boiler business, and will be pleased to send illustrated catalogue and full description of their work to parties interested. They also make stacks of all sizes and weights of iron, and tanks according to any specification.



THE STAR WATER TUBE BOILER FOR STEAM OR HOT WATER.

Resistance to Fire of Wood Posts.

The endurance of wood posts when subjected to the action of fire is strikingly shown in a fire which occurred in a warehouse of enormous proportions, and raged with great fury for five hours, at the end of which time it was extinguished. According to the *Architect*, London, the warehouse was constructed of brick walls; it had wooden floors supported on wooden beams, which, in their turn, were carried on wooden story posts about twelve inches thick, and, although serious damage was done, not one portion of the heavy woodwork was destroyed. After the fire, the proprietors allowed the chief of the fire brigade to remove one of the story posts, with a section of the beams and other parts surrounding it above and below. This post had been subjected to the full action of the fire during the whole of its duration, as already mentioned, or making full allowance for everything, including the delay of the fire attacking the particular spot on which it stood, and the time at which the cooling process commenced, certainly not less than four and a half hours. As large quantities of water had been used, and it was probable that everything had been saturated, the wood was carefully dried before a strong fire until not a trace of moisture remained in it. It was then set on end in an open yard, exactly as it had stood in the warehouse, with the pedestal underneath, the cap above, and the beam across the cap. More than a ton of shavings, light wood and heavy wood were placed around it, and after the whole heap was saturated with petroleum, a light was applied to it, and after this large quantities of petroleum and turpentine were pumped on it. At the end of two and one half hours, the post, beam, and other parts were withdrawn from the fire, and within a few minutes of the time they were withdrawn they ceased to burn. A few feet were then sawed off horizontally, at that part which had suffered most from the flames, and afterward the same piece was split longitudinally with steel wedges, in order to examine its condition. The post was of pitch pine—about the most inflammable wood known—and yet after exposure for seven hours to fire, the fury of which could not be exceeded, except in blast furnaces, it contained within a quantity of perfectly uninjured and apparently fresh wood, probably capable of supporting the whole weight which the original post was designed to carry. Immediately after the saw cut, and again after the cleaving with steel wedges, the center was carefully examined, and found to be just perceptibly warm to the touch, but nothing more, thus proving that the fiber, in which the strength lay, was quite uninjured.

AN IMPROVED DOOR SPRING.

The door spring shown in the accompanying illustration, and styled by its manufacturers the "Ideal," is made of flat steel spring of the best grade, coiled within a covered drum, outside of which a steel tape is wound, the opening of the door, through the action of the tape, uncoiling the spring, the tension of which closes the door when released. This spring can be placed either inside or outside the door as desired, and can be detached very readily by simply unhooking the loop. It is made in japanned, bronze plated, and nickel plated finish, by the Caldwell Manufacturing Co., of Rochester, N. Y.

THE NORTON DOOR CHECK has been widely used to prevent the slamming of doors. It has well proved its efficiency and is a great boon to those who have suffered from this evil. No door *can* slam with this simple and necessary attachment. For sale by first class hardware dealers in the leading cities, or by the Norton Door Check and Spring Co., Sears Building, Boston, Mass. Particularly desirable for church and schoolhouse doors.

AN IMPROVED HOT AIR FURNACE.

The furnace shown in the accompanying illustration has a large and substantial ash pit, with draw center anti-friction grate, the shaker being attached on the outside, while the shape of the fire pot, being larger at the bottom than at the top, gives a clean fire through its entire space, preventing the usual forming of clinkers and banking up of ashes. The furnace also has a large amount of drum surface, giving very large heating capacity, while its construction is of the simplest possible description, insuring perfect operation and a large volume of heat for the amount of fuel consumed. Architects, builders, and housekeepers, and all others having charge of house heating, should write the Abram Cox Stove Company, Philadelphia, Pa., for their latest illustrated catalogue.

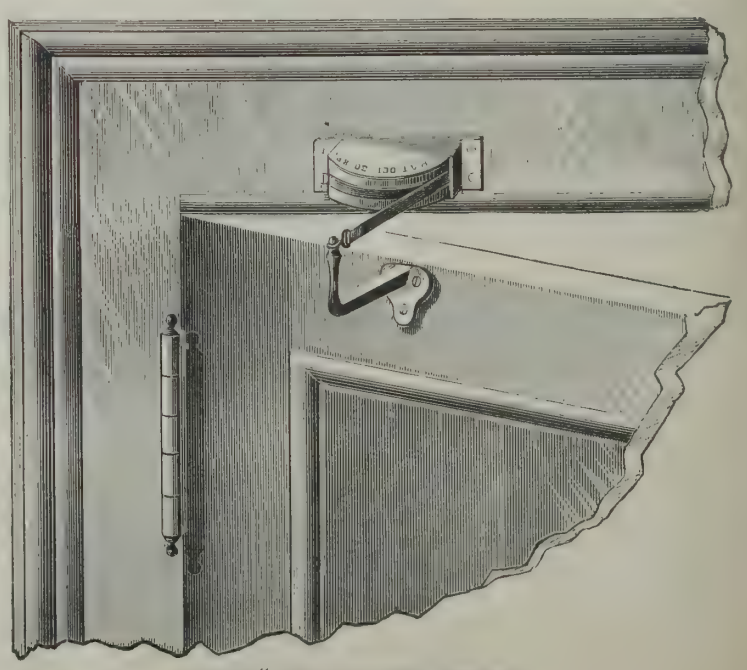


THE "NOVELTY" HOT AIR FURNACE.

The Taylor "Old Style" Roofing Tin.

The N. & G. Taylor Co., of Philadelphia, have just issued a very neat card presenting an almost exact representation of their "old style" brand of roofing tin, the mottle caused by its heavy coating being well brought out, while a *fac simile* of their embossed stamp appears in the corner. The firm stamp this brand and the thickness on sheets of tin, stamping only the perfect sheets, and thus affording valuable protection to the roofer, architect, and tinner.

MESSRS. J. D. WEST & CO., New York, manufacturers of lightning rods, write us in relation to the recent report of a stroke of lightning at the Bluff Point Hotel, on Lake Champlain, to the effect that the building was not struck by lightning at the time of the severe blow at that point during the past summer, but some time before that. The rodding of the building, it is said, had been completed but a day or two before, when a severe storm took place which aroused the inmates, and the display of electrical energy was very great, but not a particle of damage was done.



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Cannot collapse.
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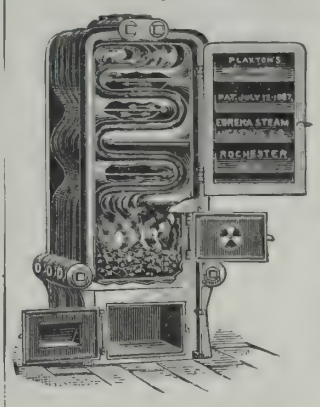
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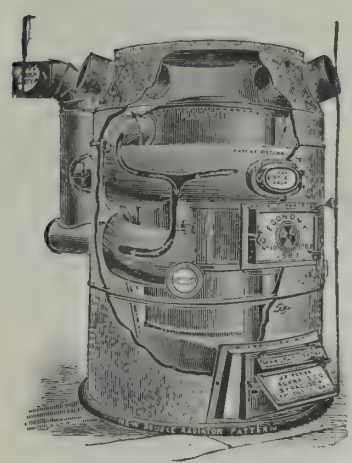
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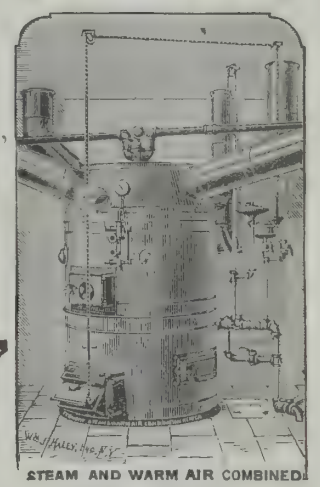
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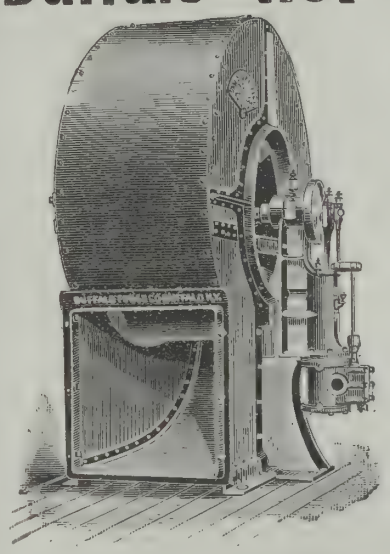
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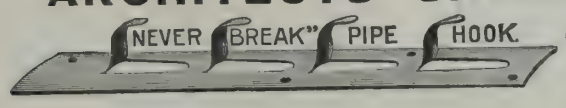
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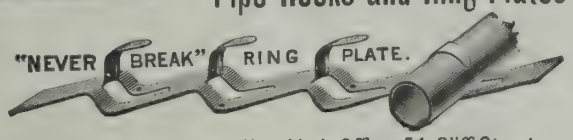
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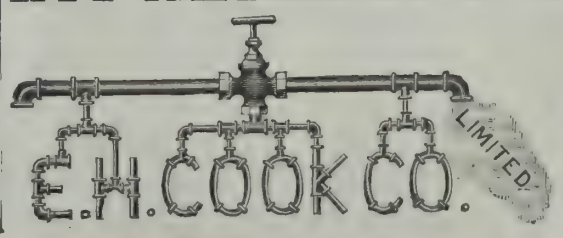
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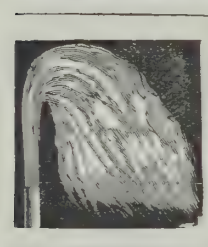
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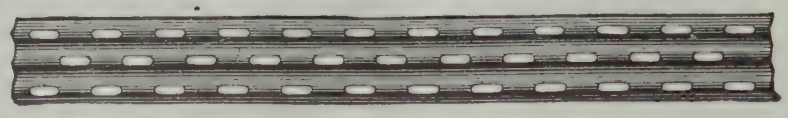
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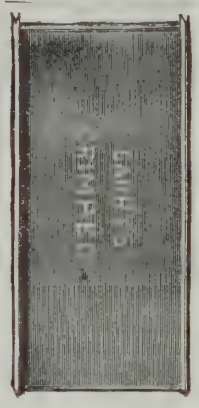
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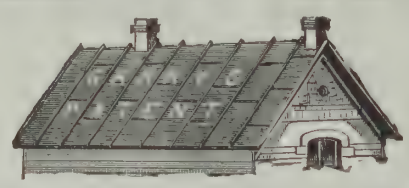
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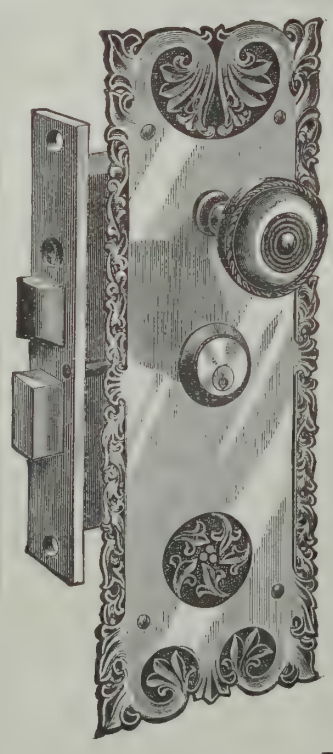
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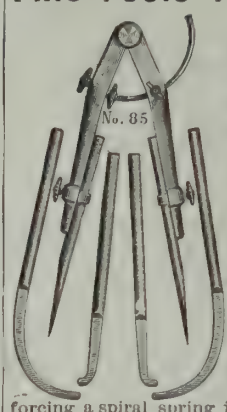
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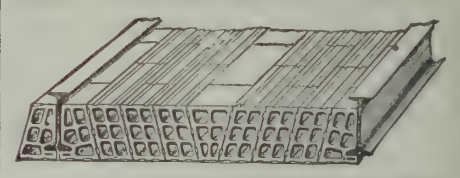
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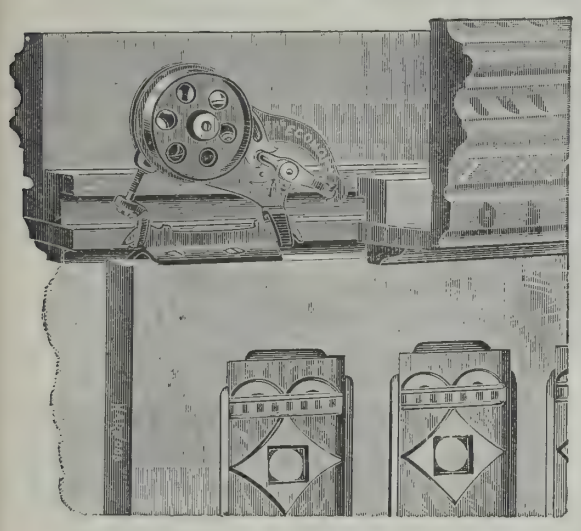


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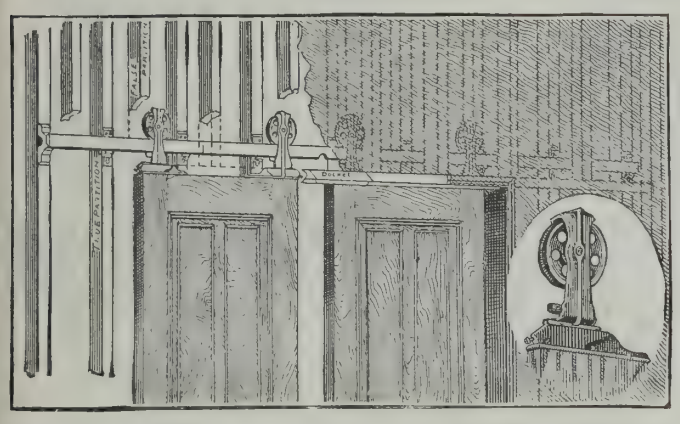
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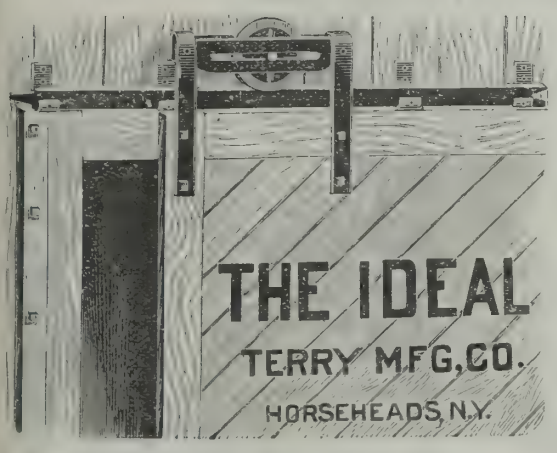
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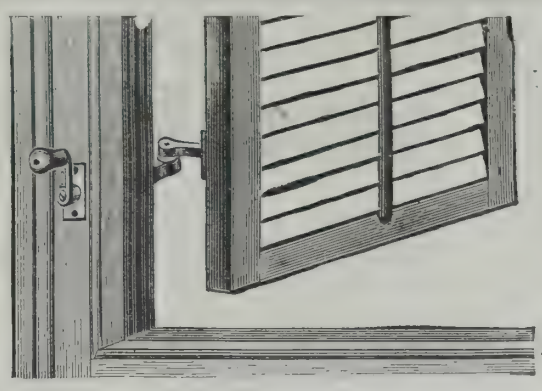


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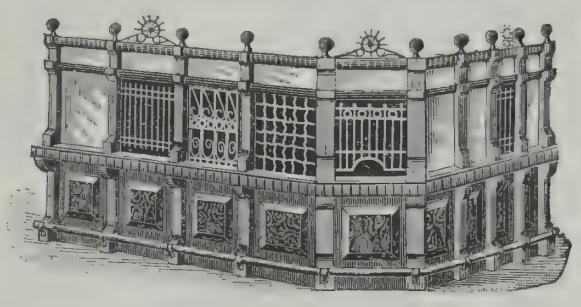
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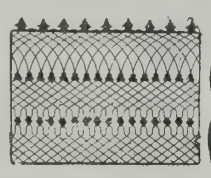
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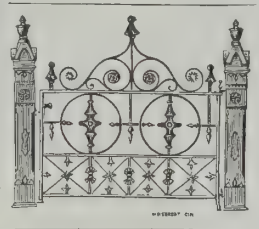
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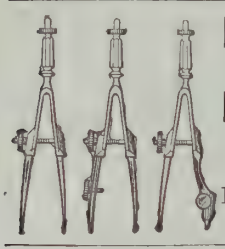


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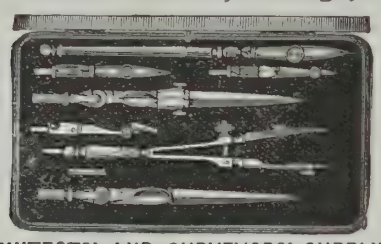
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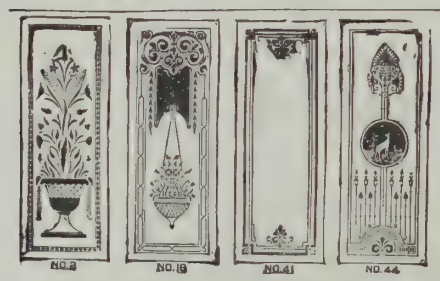
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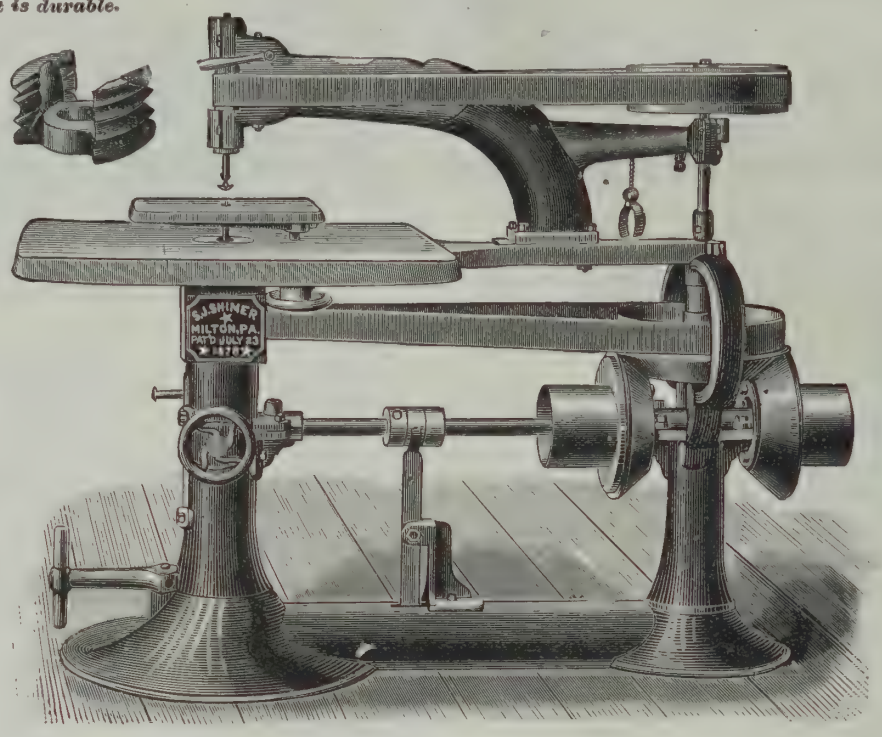


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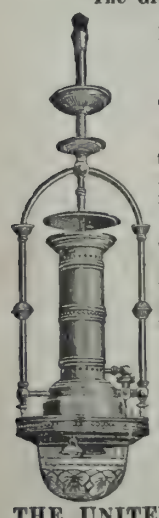
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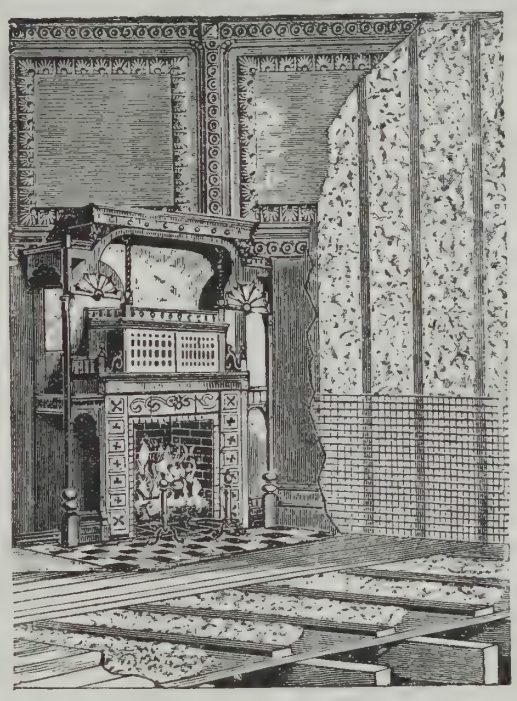
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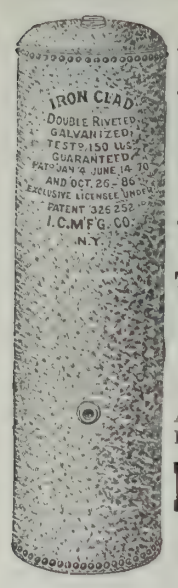
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Notes and Queries.

(1) E. E. writes: Wishing to preserve the color of the red bronze hinges of small white metal cases which get discolored (oxidized) by exposure, I would ask you kindly to inform me of any powder or solution answering the purpose. A. Varnish with linseed oil and japan if bronzed; if of real bronze, apply lacquer.

(2) A. S. B. asks for a recipe for fixing drawings made with carbon pencils, that the drawings will not rub out or be spoiled if touched. A. Immerse the drawing in skimmed milk. A special fixative is sold for the purposes by dealers in art materials.

(3) D. S. McK. asks (1) how water color paint is made (red, blue, and green), the kind flour barrel heads are painted with. A. The colors may be mixed with weak size, or an oil paint thinned with turpentine may be used. 2. How phosphorescent paint is made, *i. e.*, the kind that shows a sort of a light in the night (often found on match safes). A. You refer to Balmain's luminous paint. Papers on its use, preparation, etc., will be found in our SUPPLEMENT, Nos. 229 and 249. 3. What form will compressed air assume when it is pumped into an air-tight vessel? Does it become warmer or cooler, and does it hold its warmth or coldness for any length of time? A. It becomes warmer, but soon loses its heat by conduction through radiation from the sides of the receiver.

(4) C. N. V. asks: In burning rock for hydraulic cement, with soft coal, what proportions of rock and coal are used? Are the rocks and coal put in the kiln in layers or mixed together? A. The burning of cement rock is referred to in Gillmore's "Limes, Hydraulic Cements and Mortars," page 127. 3,500 pounds of anthracite he states is sufficient to produce 30,000 pounds of cement. The fuel and stone are placed in layers, the stone not exceeding a thickness of 6 inches. Bituminous coal will not vary greatly in results from anthracite.

(5) J. H. N. asks: 1. How many cubic feet of gas can be produced from 50 pounds of dry oak wood and from 50 pounds coal (the kind used ordinarily under steam boilers)? A. About 225 cubic feet in each case. 2. What gas is of most value for heating purposes? A. The coal gas.

(6) O. J. H. asks: 1. In case of an electrical storm is it best to close up the house tight, or else leave it wide open, and why? A. It is best to close the house, as the warm air currents from the open windows and doors form good paths for the lightning discharge. 2. If a person is above the clouds, can an electrical storm or any other do him harm? A. If above the clouds and still upon the earth, there would be danger. 3. How can I harden paper so as to make it as hard as wood or canvas? A. It is generally hardened by treatment with dilute sulphuric acid. It is also hardened by compression and by treatment with size. 4. Which propels a vessel the fastest, a screw or paddle wheels, and are there any other kinds of propellers? A. In the matter of speed there is not much difference. There are many other propellers, among which are the turbine, the water jet, reciprocating paddles, etc. 5. What is air composed of? A. Oxygen 20·96, nitrogen 79, carbonic acid 0·04.

(7) G. B. D. asks how to color sand blue and black for painters' use. A. We presume you refer to blue and black smalt. These are composed of pulverized glass of the desired color.

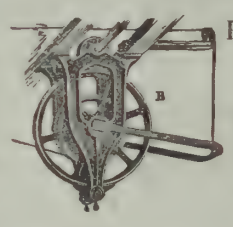
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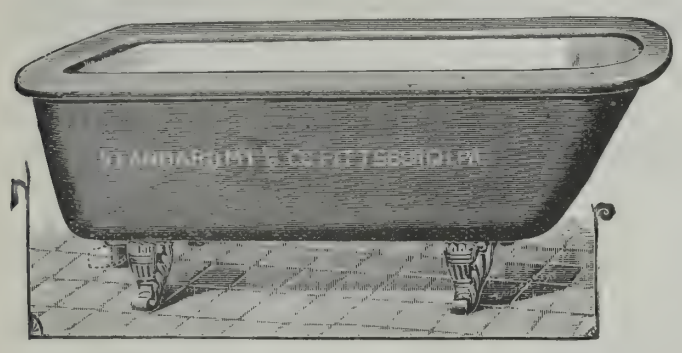
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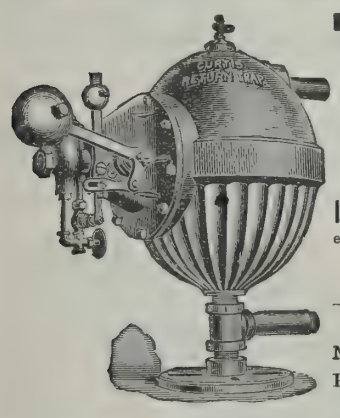
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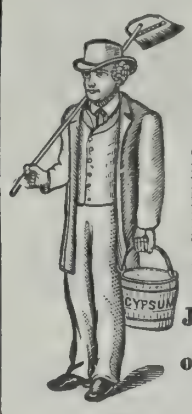
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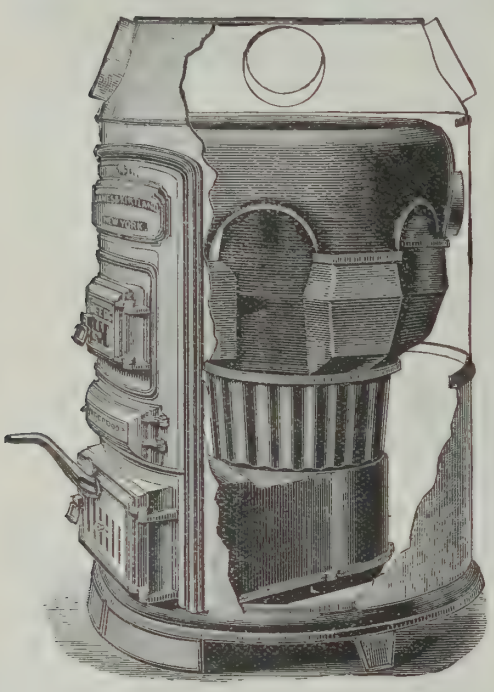
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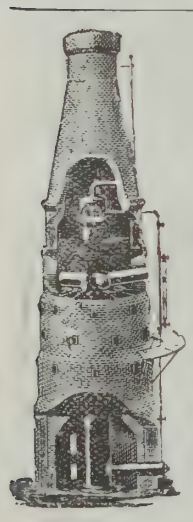
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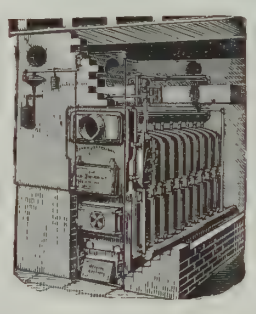
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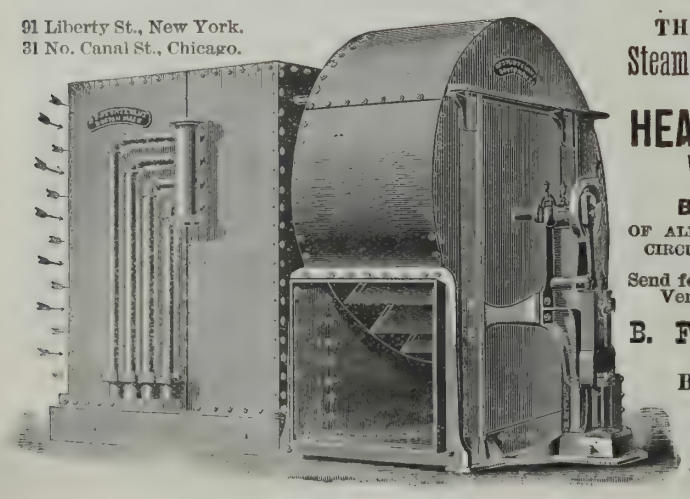
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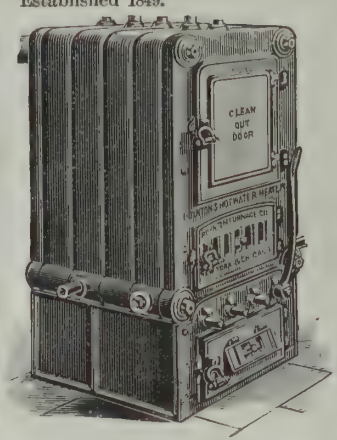
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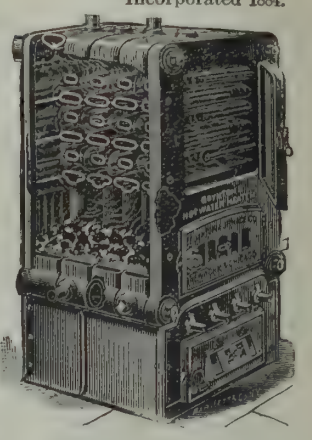
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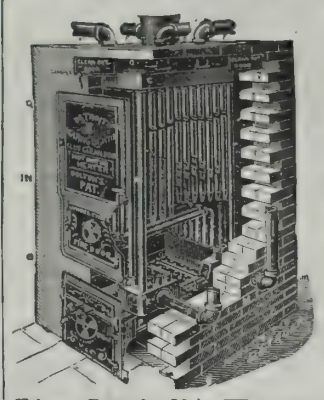
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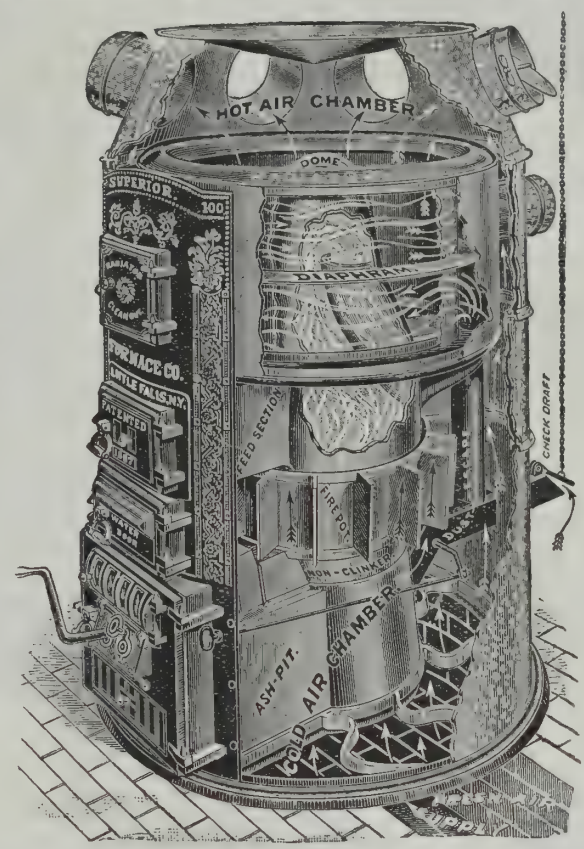


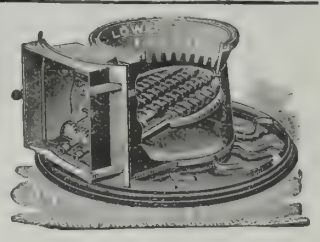
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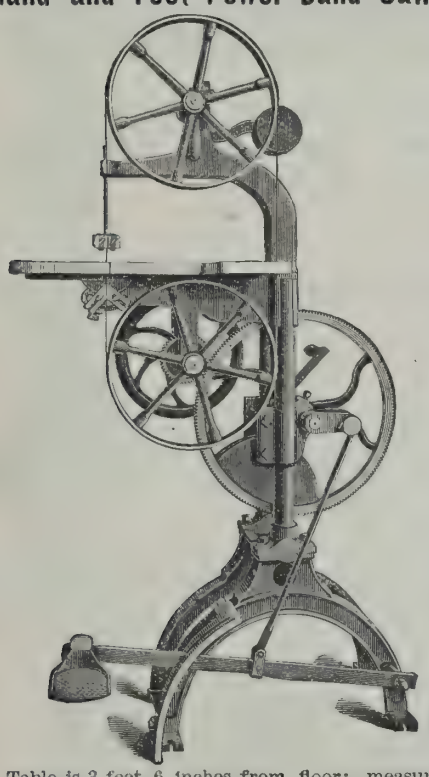


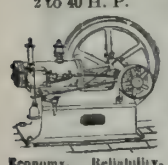
Table is 3 feet 6 inches from floor; measure 18 x 21 inches; is adjustable for cutting on a bevel. Guide for saw both above and below table. Distance from table to guide when raised its full height, 5 inches, 16 inches between saw and frame. All gears cut from solid iron. Shafts are made of steel. Saw pulleys covered with rubber. Upper saw pulley has adjustment to bring it into line with lower saw pulley. Weight of machine, 260 lbs. Machines on trial.

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(8) C. H. H. asks (1) how to destroy the musty smell which we have so frequently in brick houses. A. To destroy this odor, keep the house well ventilated, allow no trees to grow near it, in order that plenty of sunlight may fall upon the walls. 2. The best work on designs for farm barns. A. We recommend and can supply "Barn Plans and Outbuildings," $1.50.

(9) G. H. B. asks: 1. What chemical or other solutions are there that have fireproofing qualities? (For instance to saturate cloth or paper.) A. Tungstate of soda and phosphate of soda are excellent, especially the first. Even common salt has some power. 2. What wash or paint, that adheres well when exposed to weather, has fireproof properties? A. For rough work a wash made of cement and water might be recommended. For a roof paint consult our advertising columns. 3. What ingredients added to common whitewash would greatly increase its adhering property? Iron oxide paint partly answers this, but I want a paint or stain for roof, preferably in green, that will hold, and I do not think the stains, now much used, are satisfactorily permanent, except in red. A friend showed me a number of barns built of rough hemlock boards. He made a thin glue sizing and gave them a wash of it, following immediately (when dry) with a coat of mineral (iron) paint. It gave the buildings a smooth finish, and paint lasted for years, and for that matter still lasts. I was surprised at its lasting quality and mentioned it to a house painter; he said it was a good and satisfactory way to treat such buildings. A. The government receipt for whitewash, already given in these columns, may be repeated: Slake ½ bushel of lime with boiling water, keeping it covered during the process, strain, and add 1 peck of salt dissolved in warm water, and 3 pounds rice flour boiled in water to a thin paste, ½ pound Spanish whiting, and 1 pound clear glue dissolved in warm water. Let it stand several days and apply hot. 4. Crude petroleum applied to wood has preservative qualities. Would green or other pigment added (for roof) give a permanent color? A. No pigment should be added to crude petroleum. 5. Could any ingredient be added to overcome the combustible nature of the petroleum? A. No.

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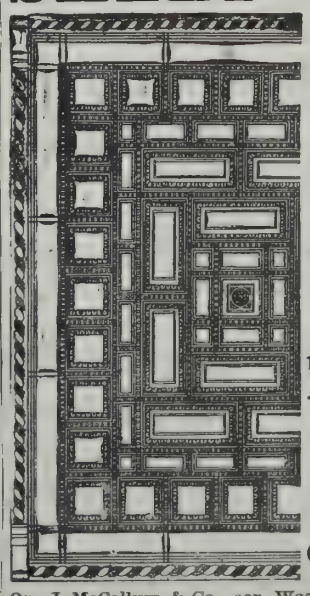
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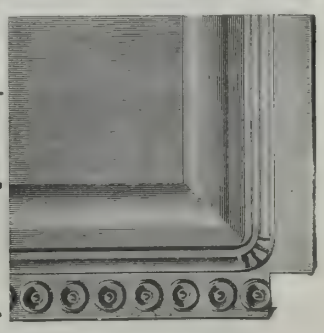
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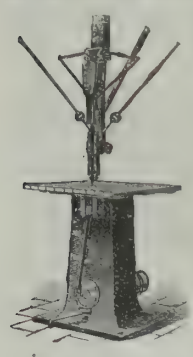
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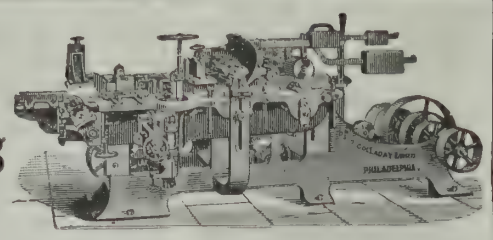
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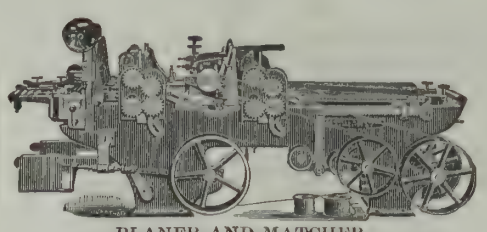


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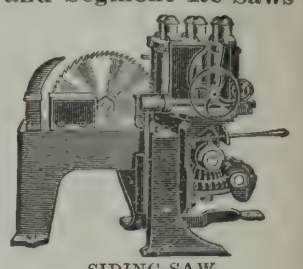
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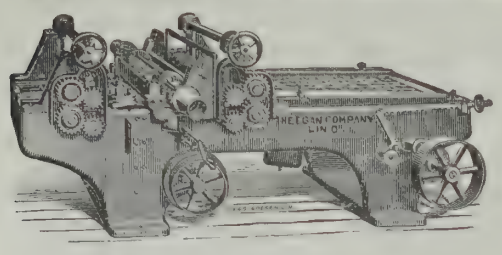


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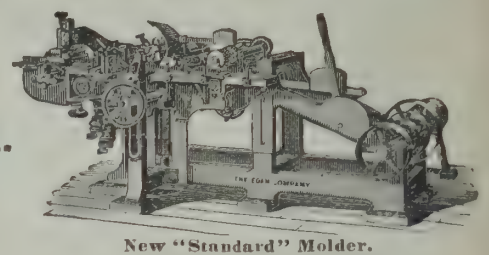
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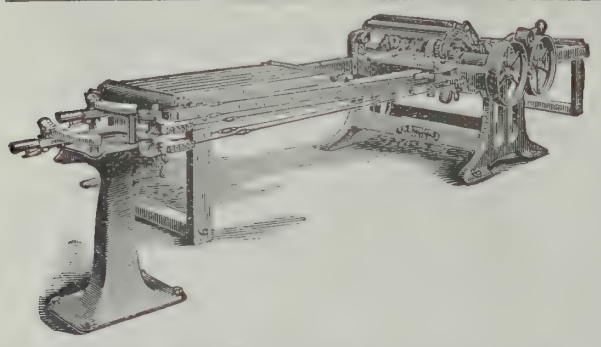
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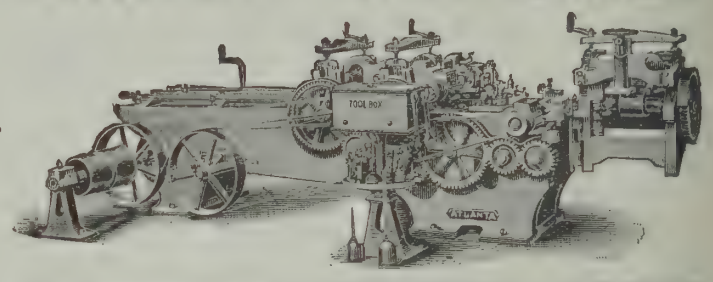
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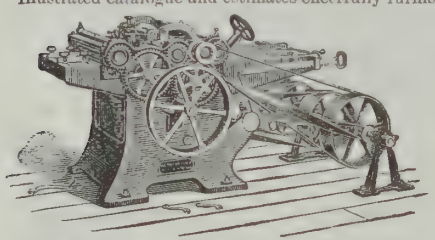
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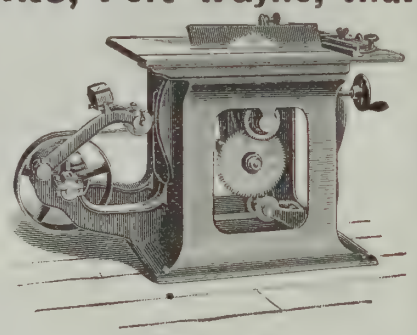
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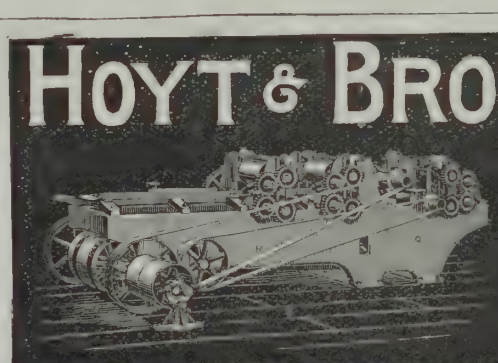
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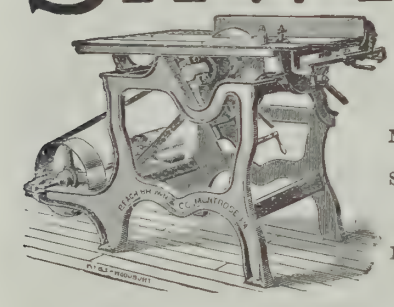


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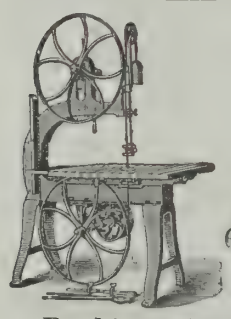
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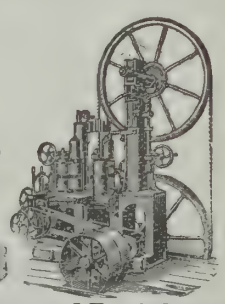
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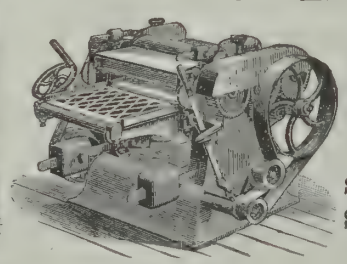
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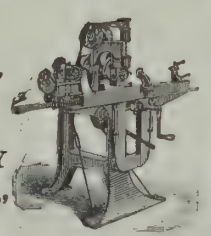
Band Saw.



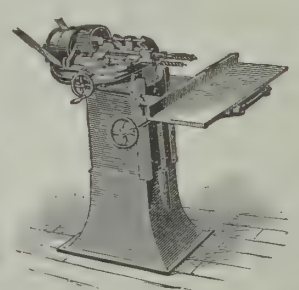
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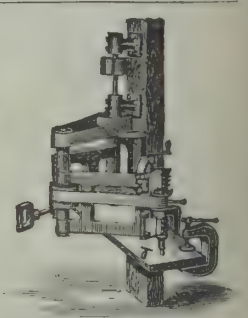
Feed Planer.



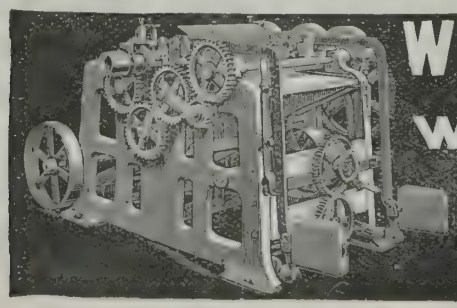
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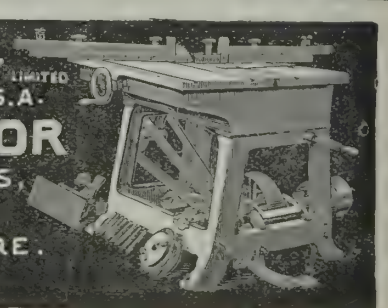
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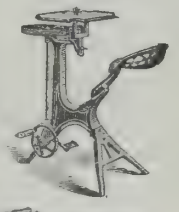


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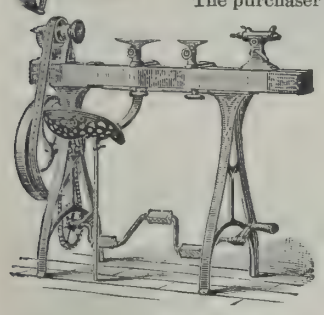
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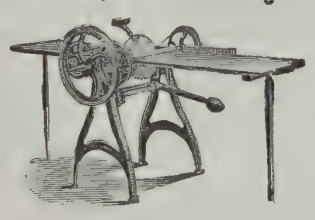
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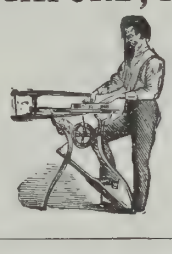
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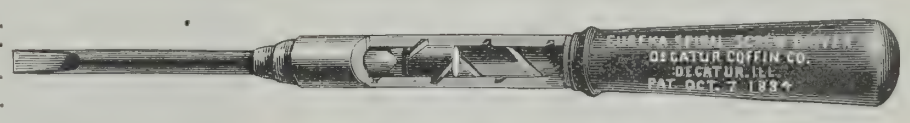
Push on the end of the handle and the screw goes in.

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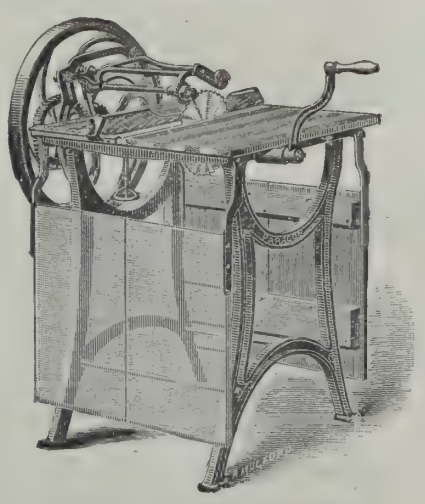


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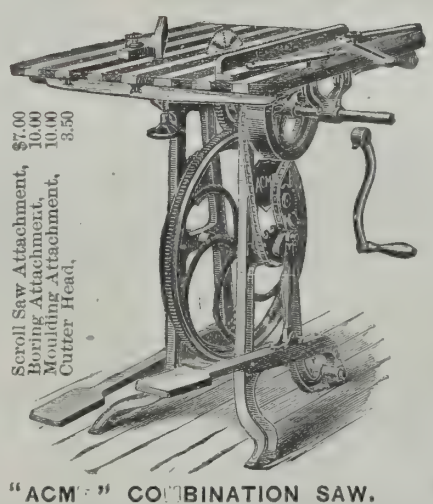
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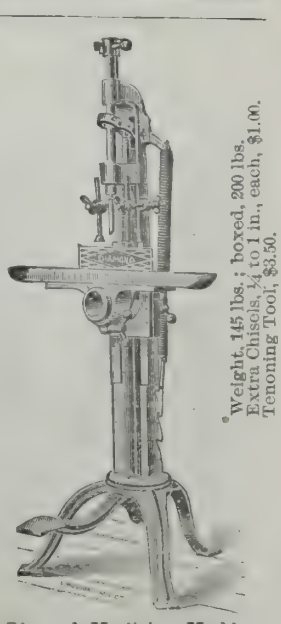
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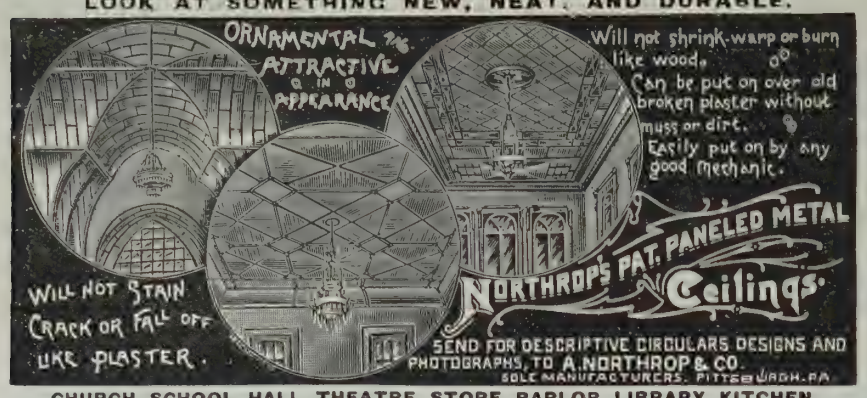
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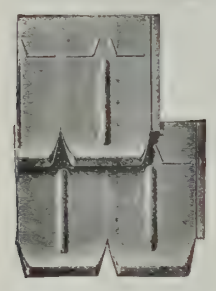
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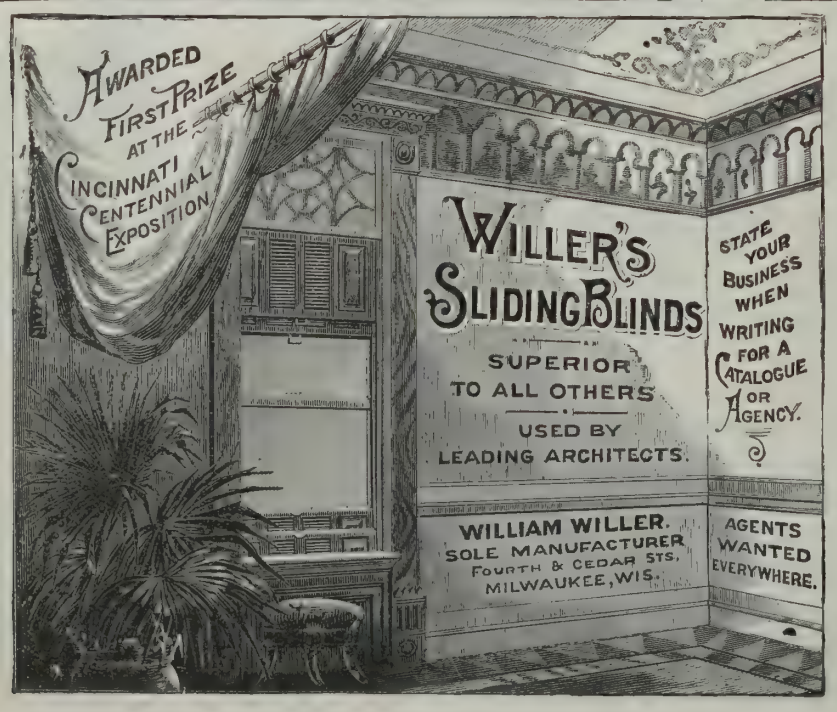


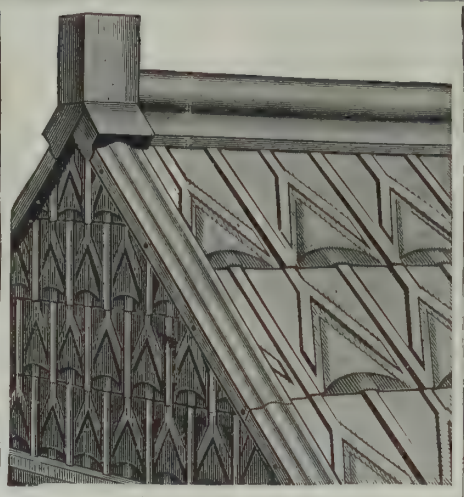
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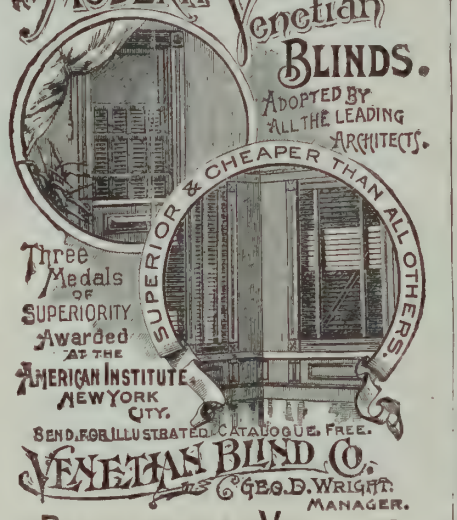
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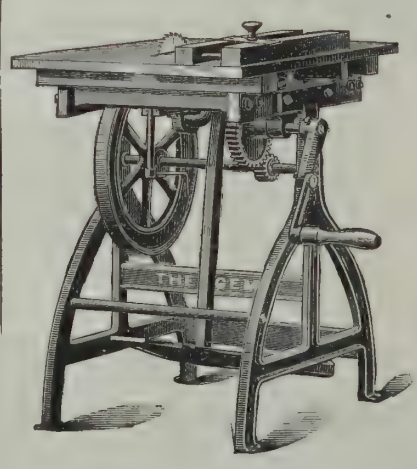
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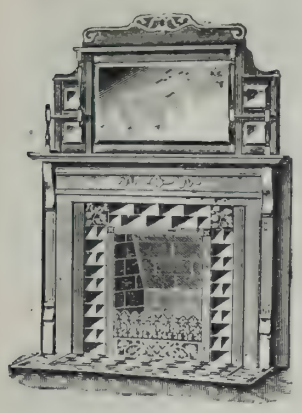
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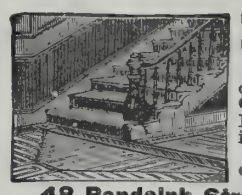
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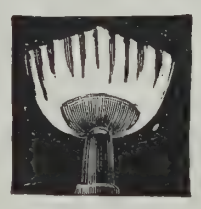
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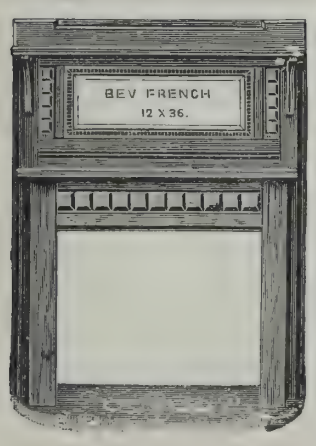


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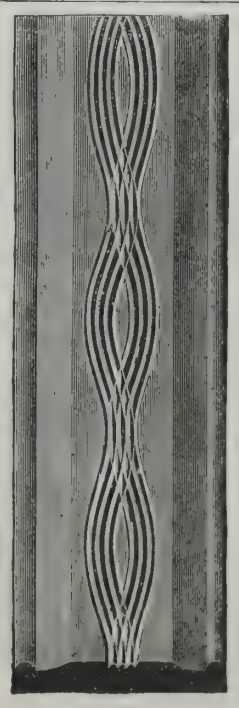
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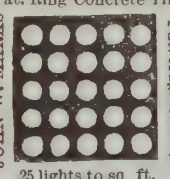
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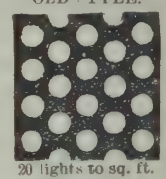
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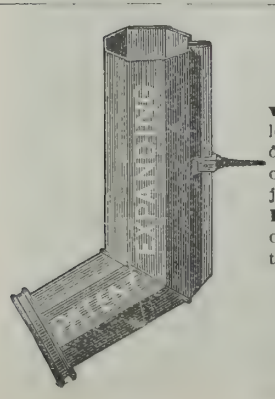
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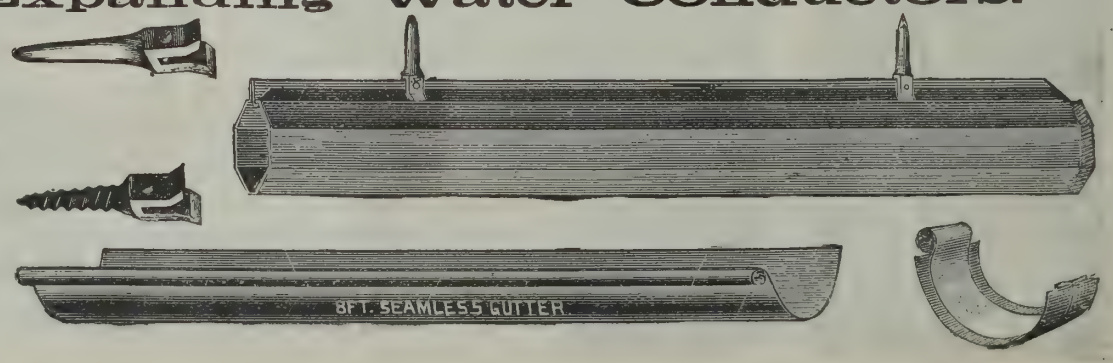
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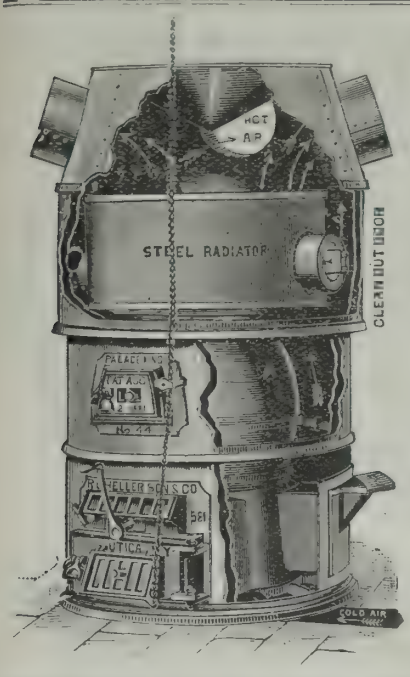


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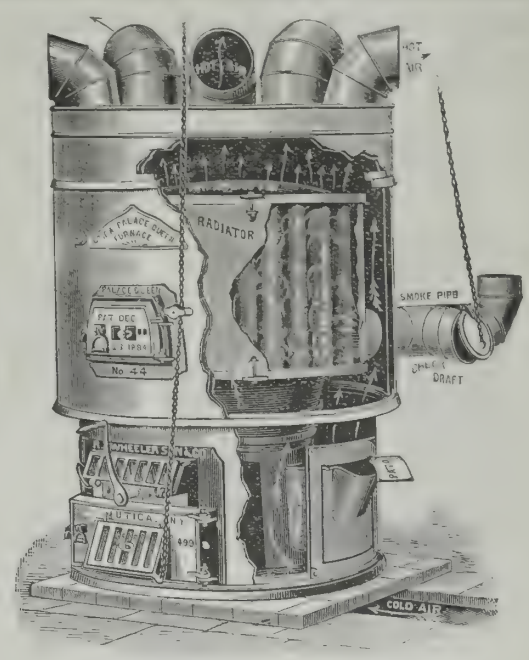
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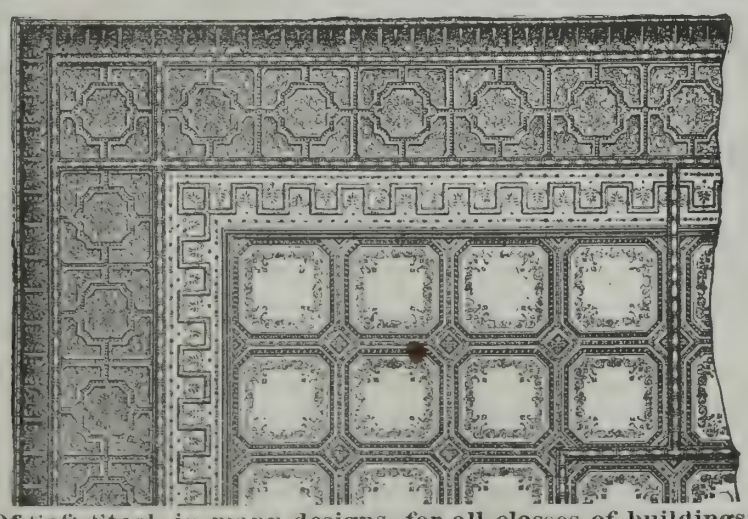
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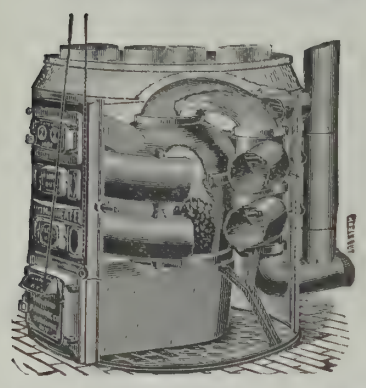
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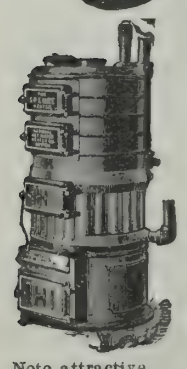
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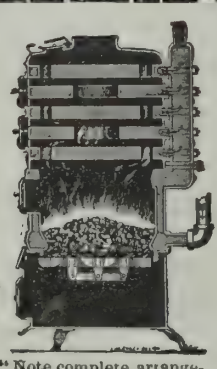
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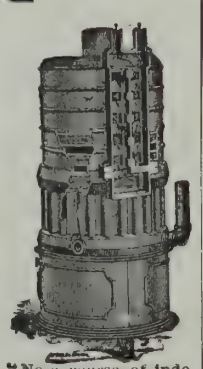
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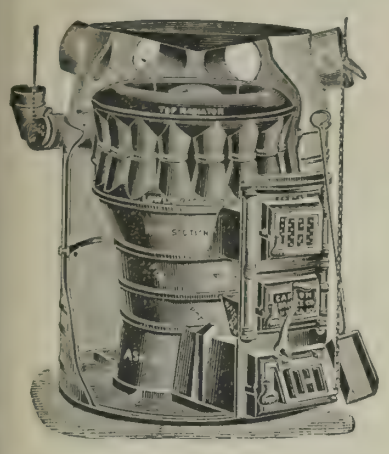
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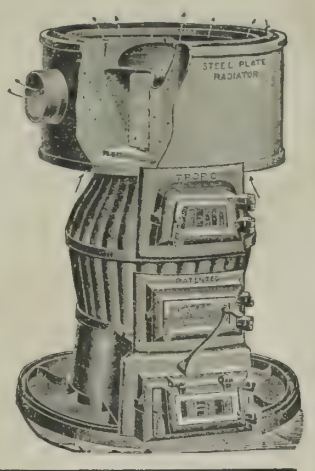
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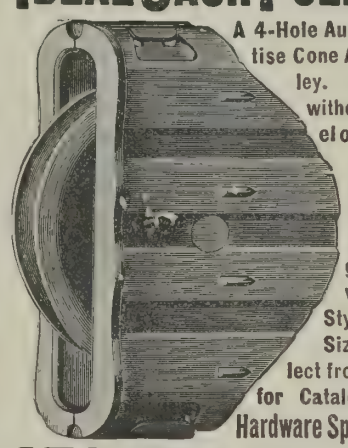
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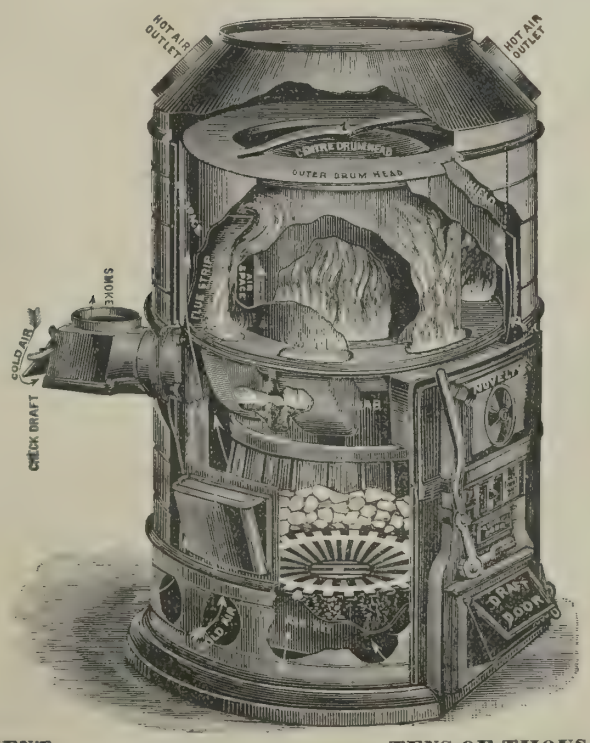


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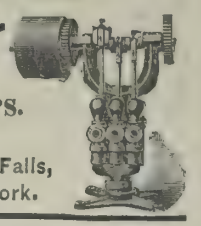


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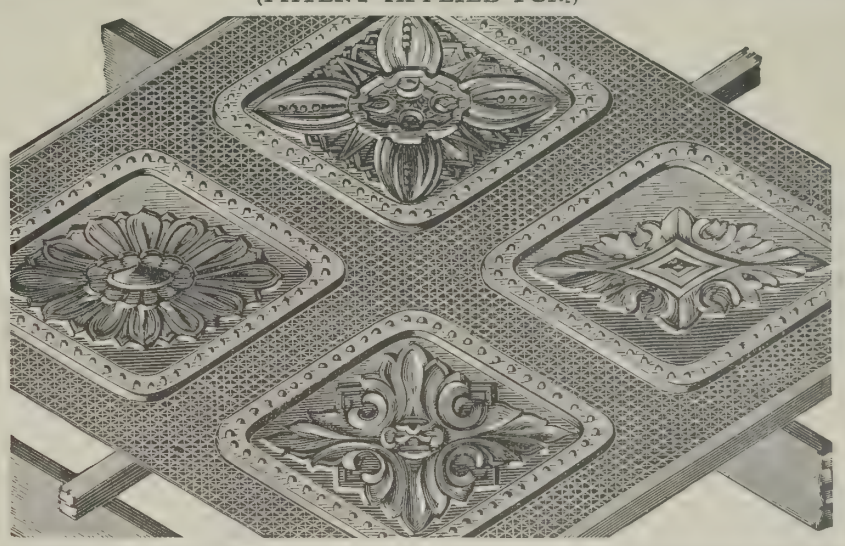
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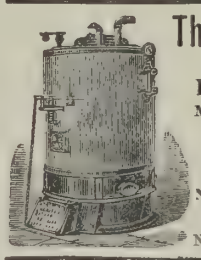


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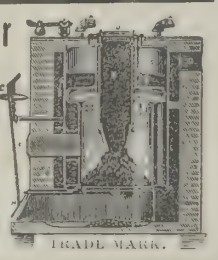
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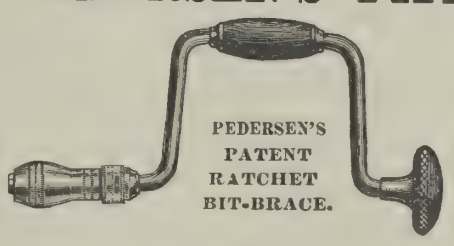
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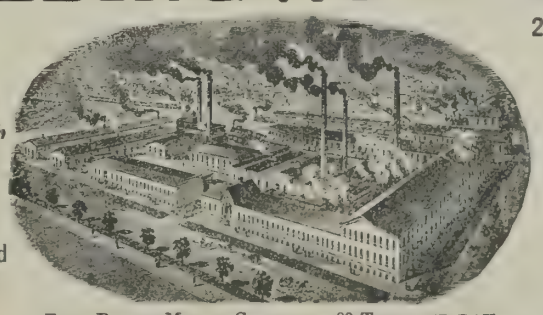
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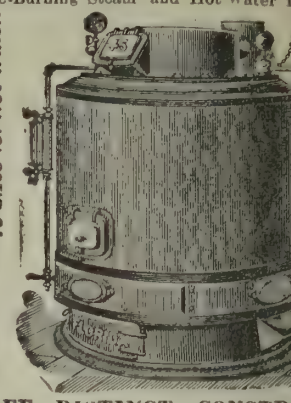
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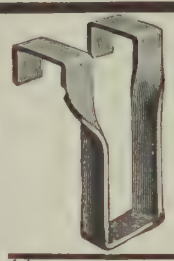
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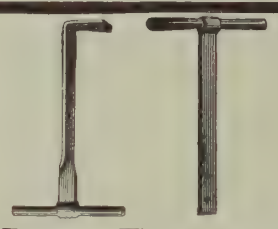
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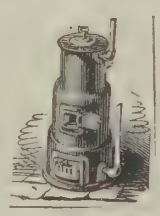
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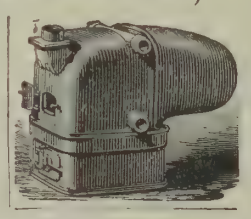
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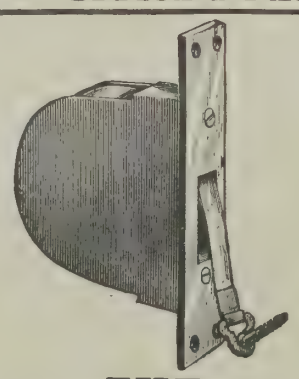
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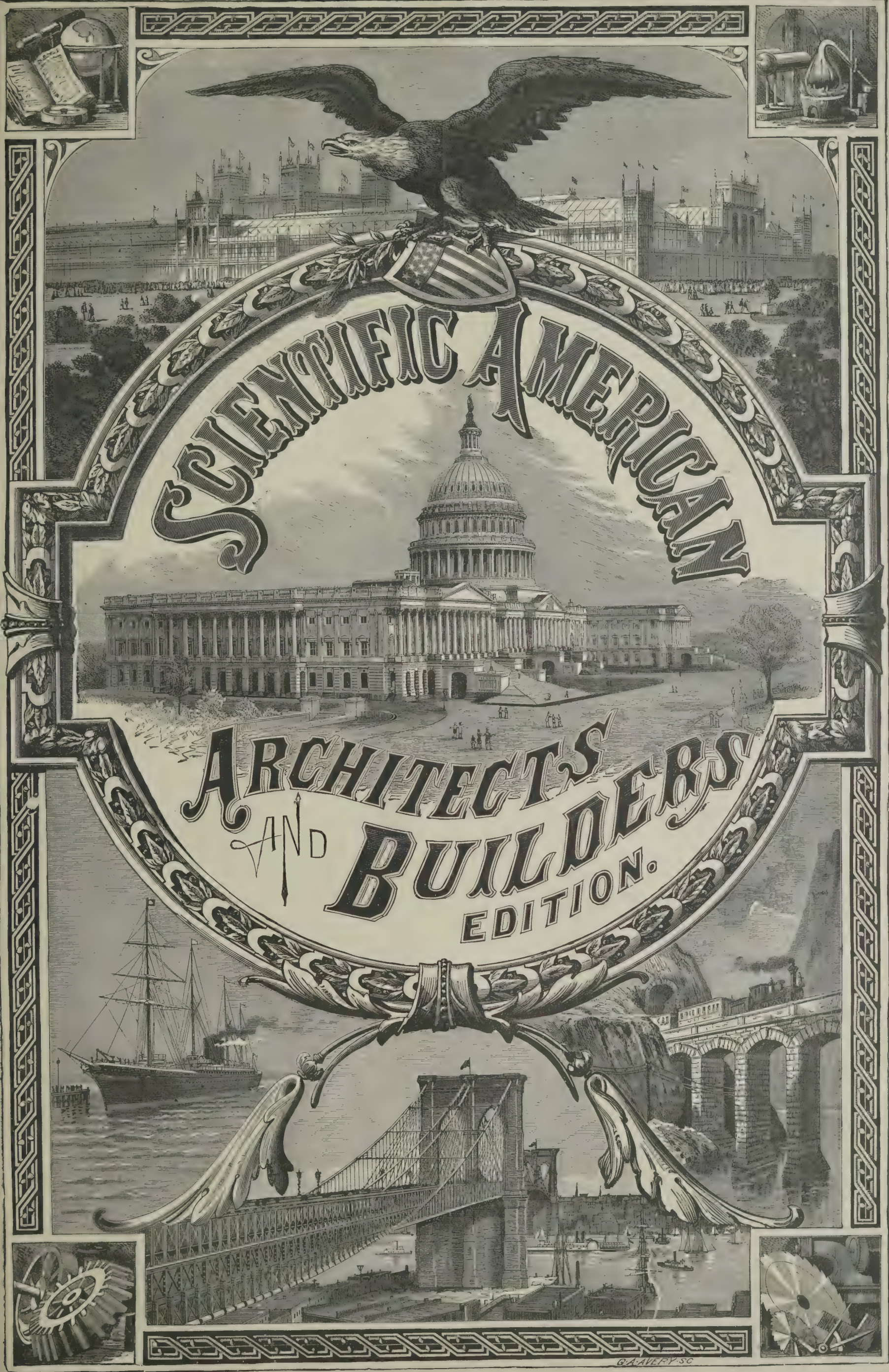
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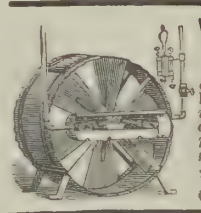
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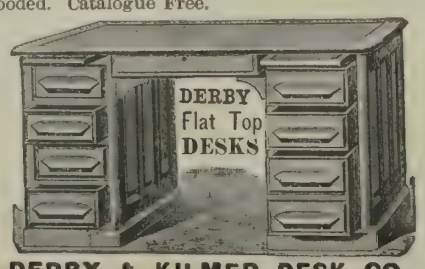


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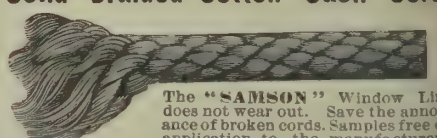
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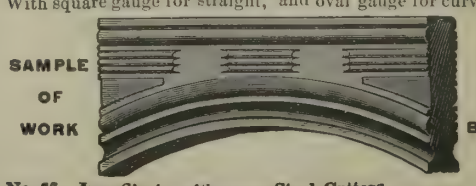
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☞ See Classified List of Advertisers in present Number on pages xv and xvi.
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SCIENTIFIC AMERICAN

ARCHITECTS AND BUILDERS EDITION.

Entered at the Post Office of New York as Second Class Matter.

Vol. X. Subscription, $2.50 a Year. NEW YORK, DECEMBER, 1890. Single Copies, 25 Cents. No. 6.

THE HACKLEY PUBLIC LIBRARY.

The dedicatory exercises of the Hackley Public Library, at Muskegon, Mich., were held in that city, Oct. 15, 1890. Charles H. Hackley, the donor, has amassed a large fortune, primarily in lumbering, and latterly in various other branches of business; yet he is best known as a lumberman, and has been the prime factor in operations in western Michigan for the past quarter of a century. He chose the board of education as the trustees to carry out the benefaction, and gave to them the power to build this structure, the finest and best arranged library building in the Northwest.

The building, now completed, is a marvel of architectural beauty, an ornament to the city and State, and an enduring monument to the founder. The building has cost, under the most economical construction, $125,000, which, with the grounds and furnishings, and the 25,000 volumes with which the library building opens, will amount to at least $150,000. Nor has the generosity of Mr. Hackley stopped with this deed; the people are still farther indebted to him. Just opposite to the library building, in the very heart of the city, Mr. Hackley has purchased an entire square from which all the buildings have been moved, and it has been converted into a public park, to be dotted with statuary, fountains, etc., in the midst of which will stand a monument to the Muskegon soldiery whose lives were sacrificed in the war of the rebellion. This gift, with its attendant improvements, amounts to about $100,000.

The library is now thrown open to the public, and to its shelves, enriched by about 25,000 volumes, will be added yearly from the fund created by the city volumes which will amount in value to about $5,000. The building is one of the most complete and carefully studied library buildings in this country.

It is purely a library building; that is, it has a complete and perfect arrangement for the storage and classification of a large number of books, and ample accommodation and conveniences for its readers. It is fire proof, built of Maine granite and Marquette brownstone, and of the very best materials and workmanship throughout. The exterior clearly expresses the features and arrangements of the plan. The three-story octagonal tower at the corner, with its steep slate roof and rich stained glass windows in its upper part, indicates the main stairway, while the smaller tower suggests another flight. Massive gables, with large openings in both stories, give an abundance of light for the reading rooms, while the high book room at the rear, with its numerous windows well up from the floor, shows that portion of the building which is devoted to the storage of books

The tower, three stories in height, and open to the top of the vaulted ceiling, with its rich detail of iron-work and brilliant and effective colored glass, is one of the most striking features of the interior. To the right, from the entrance vestibule, double doors open into the delivery room, which is 29×50 feet. The visitor, upon entering, sees at once into all the principal rooms on the floor, for the book room is a continuation in a straight line of the delivery room, only separated from it by three graceful arches supported upon carved piers of Portage stone.

The delivery room is floored with white marble tiling, wainscoted in quartered oak, and has a huge carved mantel of Portage stone with Roman mosaic hearth immediately opposite the entrance. The reading room is 31 × 39 feet, with a large carved oak mantel forming a prominent feature. One end of this room is semicircular in form, separated from the main portion by two massive columns with circular tables at their bases. Two openings with ornamental grille work and portieres lead to the cozy ladies' alcove at the front; at the rear a door leads to the book room and to the librarian's room. On the other side of the delivery room, with a door opening also into the entrance vestibule, is the reference room, 21 × 31 feet, finished in mahogany, with a large carved mantel corresponding to the one in the reading room.

The main stairs in the tower lead up to the second story reading room, which is 32 × 90 feet A large arched window, the transoms of which are filled with decorative glass, flanked by two smaller ones throw in a flood of light at one end, and numerous plate glass windows at the other, which is semicircular, corresponding with the reading room below. The ceiling is elliptical in form, divided into bays by three arches following the curve of the ceiling and supported by pilasters against the walls. In the center a large ceiling light of beautifully toned glass throws a soft and mellow light into the room. The decorators have had an opportunity to do some very clever work in this reading room—the bold and graceful form of the ceiling being especially adapted for decorative effects. The large, delicately modeled terra cotta mantels of similar design are features at one side of the room. At the other huge sliding doors open directly into the directors' room, 16 × 29. The system of heating is by hot water, both direct and indirect radiation being used in all rooms, combined with a carefully planned scheme for ventilation. In this, as in other respects, the architects, Patton & Fisher, of Chicago, have spared no pains to make the building a perfect success.—*N. W. Lumberman.*



THE HACKLEY LIBRARY BUILDING.

Some of the Merits.

The present number of our journal completes the year, when an excellent opportunity will be afforded for the entry upon our books of new subscriptions. We rely upon our large host of present readers to make known to their friends the merits and value of this periodical, thus aiding us in the augmentation of our list and the consequent improvement of the work.

One of the distinctive features of our publication is the presentation in every number, both in colors and in half-tone prints, of new and fresh collections of photographic views showing recently built dwellings, and other structures, with the floor plans. In this way we place before the reader a great variety of the very latest and most approved forms of construction, not from one locality only, but selected from every part of this great country. Wherever good taste prevails in the display of architecture, especially in the branch pertaining to homes and dwelling houses, there the artists of the SCIENTIFIC AMERICAN, with their cameras, do sooner or later make their appearance.

The usefulness and influence of our periodical is now widely and permanently established. Many of those who contemplate the erection of buildings now consult its pages for good plans and elevations, which are here given in numerical profusion.

The practical builder finds the SCIENTIFIC AMERICAN to be almost a necessity for himself and for his customers. With the plans and photographic elevations which we give, the builder is enabled easily to modify or to duplicate any of the structures we illustrate.

The photographs show the exact form, position, and details of the principal parts, and the builder is never at a loss how to proceed. Of these facts we have the most abundant and convincing testimonies. Many thousands of new buildings have been and are constantly being erected in all sections of the country from the plans given in the SCIENTIFIC AMERICAN, and as a result there is to be seen on every hand a marked and growing improvement in architectural styles. Builders now aim to select, even for the cheapest houses, the most tasteful designs, and of these the SCIENTIFIC AMERICAN regularly furnishes to them an abundant and satisfactory supply.

When the design of the building is selected and the work of construction begun, the next subject for consideration is the plumbing, the warming, the lighting, the hardwaring, the glazing, the adorning, the painting, the finishing, and finally the furnishing and household fittings of the building. In all of these matters the pages of the SCIENTIFIC AMERICAN teem with the most valuable information. Here may be found the illustrated announcements of the most reliable manufacturers of every class of materials, goods, and appliances required in buildings. In this department of the paper upward of two hundred engravings are given in every number. The value as a convenience to the reader in having constantly at hand an illustrated, comprehensive directory of the latest productions cannot be overestimated.

A RESIDENCE AT PLAINFIELD, N. J.

One of our plates in colors this month illustrates the residence erected for Mr. Alexander Gilbert, at Plainfield, New Jersey. Dimensions: Front, 53 ft. 6 in.; side, 55 ft. 6 in., not including the piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 10 ft.; third, 9 ft. Underpinning and the superstructure above is built of pressed brick, with the exception of third story and part of second, which is of wood covered with shingles and painted red. The roof is covered with slates. Hall, spacious, is trimmed with antique oak, and is furnished with a hard wood floor, panel wainscoting, and an ornamental staircase with carved newels, balusters and rail. This hall also is provided with a large beveled plate mirror running from floor to ceiling, Reception room, finished in the Renaissance style with ivory white and gilt, is provided with a fireplace furnished with a white tiled hearth and an exquisite mantel with mirror. Parlor is trimmed with cherry, and dining room with oak. Each has fireplaces furnished with tiled hearths and hard wood mantels. The latter also has a paneled wainscoting and ceiling beams. Kitchen and pantries are wainscoted and trimmed with North Carolina pine, finished natural and all replete. There are three bed rooms, billiard room and bath room, trimmed respectively with cherry, mahogany, bird's eye maple and ash. Billiard room is wainscoted and has a hard wood floor. Bath room is also wainscoted and fitted up in the best manner. There are four bed rooms on third floor. Cemented cellar contains furnace, laundry, and other apartments. The house is furnished with furnace, range, electric bells, and all modern conveniences. Cost $20,000. Messrs. Rossiter & Wright, New York, architects Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN. On page 94 we give a sheet of details.

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HOW TO CATCH CONTRACTS.

When a customer calls to talk house to an architect or builder, one of the readiest means to inform and interest him is to show the various numbers of the SCIENTIFIC AMERICAN. These are replete with photographic pictures of new and tasteful dwellings and plans. Our customer looks at this one, and that, until he finds a plan that nearly suits his fancy, except that the kitchen is not just as he could wish, or the hallway, or that closet, or "I should like it better if a dormer window were there," or some other minor change were made. To which the builder frankly replies that he understands his wishes to a dot, and will be glad to make up a plan for him; will have it ready to-morrow; and, moreover, "it shan't cost you a penny." This liberal and agreeable treatment is highly appreciated by the customer. After his departure our architect or builder whips out his tracing paper, follows the plan selected, puts in the few changes suggested, perhaps adds a front elevation of the house, all involving but a short time. The customer, on calling, is delighted. The drawings look like new plans specially made for him; is satisfied this architect or builder is the man for him. His mind is at once made up, and the bargain soon settled and closed. Such, in brief, is the way it works, and we have not related any fairy story. It is the short narrative of hundreds of actual instances. We say to architects and builders everywhere, your interests are sure to be promoted if you keep on hand and make yourselves familiar with the numbers of the SCIENTIFIC AMERICAN, so that you can readily display them to your customers, and point them to examples such as they require. There is no other work like it, none that has so wide a circulation among builders, none that does them so much practical and financial benefit. It assists to educate customers up to the point of having good houses, and it does this quickly, for it employs the most effective of all means for rapid education, namely, the *attractive and truthful picture.* Nearly all the illustrations given are photographic plates made from the buildings, showing all the minute details. These plates are specially prepared for the SCIENTIFIC AMERICAN. Every number presents a new and fresh supply. They are not fancy sketches, but genuine photo. plates of the objects they purport to illustrate. You cannot do a better thing for yourself than to subscribe for this paper. You cannot do a better thing for your fellow architects and builders and for your neighbors than to urge them to subscribe.

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Whoever owns a town lot is apt to be looking forward to the time when he will erect upon it a dwelling, and at first blush he thinks he will be satisfied with a house of extremely moderate cost. This might be the correct thing to do if only his present monetary affairs were to govern, but there are other considerations which should not be overlooked. Perhaps the property is your chief possession, and you may have reason while you live to wish its value were increased. You may need to rent or sell it; or your children who come after you may be obliged to do so. Which do you think will most increase the value of the property—a poorly built, cheap house, or a substantial, attractive and comfortable one? Which will sell the easiest? Which will rent for the most? Which tends to raise the value of property in a community—good and tasteful dwellings or flimsy and common-looking concerns? We say to every lot owner, when you set about the improvement of your property, do your level best to put up a good building, for when completed it is there to stay and will give you satisfaction. A first class house is almost like a deposit of gold in a sound bank. You can always sell it or rent it at the highest market price. Everybody wants to live in a good house; nobody desires a poor one.

THE EDUCATION OF CUSTOMERS.

This country is well supplied with architectural papers, many of them ably conducted, of superior value as instructors of architects, exhibiting the theory, mathematics, principles, practice, rise and progress of architecture from the earliest ages. The aggregate circulation of these works is quite limited, being confined chiefly to purely professional architects, a comparatively small class, comprising throughout the entire country probably not over three thousand. The SCIENTIFIC AMERICAN occupies quite a different field. It aims principally to educate the customers of architects and builders. This it accomplishes by placing before them a constant succession of fresh and splendid illustrations of attractive buildings and plans. The beneficial influence of this method is very great, very practical, and is sensibly felt by architects and builders in all parts of the country. Their services are in greater demand because their customers, no longer satisfied with cheap and ordinary buildings, now ask for the latest, the newest, and the best designs, such as the SCIENTIFIC AMERICAN brings to them.

Our paper goes to the masses of the people, who love to look at and study the representations of good buildings.

Where the SCIENTIFIC AMERICAN freely circulates, there architects and builders thrive, there property is intelligently improved; and everybody knows that property, if attractively improved, is increased in value.

The SCIENTIFIC AMERICAN has by far the largest circulation of any architectural paper in the world, because it not only goes to architects and builders, but also to *their customers*, who vastly exceed the former in number.

This, also, is the reason why the SCIENTIFIC AMERICAN has the largest advertising patronage of all the architectural papers. It is *these customers* who order and pay for the plans, and the buildings, and the plumbing, the painting, the hardware, the walling, the papering, the heating, the lighting, the decorating, the finishing, the furnishing, and every other blessed thing that is used or placed within or without the building. "We get good returns for money spent in the SCIENTIFIC AMERICAN," say advertisers, and that settles the question.

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THE SCIENTIFIC AMERICAN A HELP TO BUILDERS.

When any one begins to think about building a home he is apt to say to himself, "I will have the house built just as cheaply as I can, at the same time make it as attractive in exterior and as comfortable within as possible." The next step is to search for plans, and perhaps some friend directs him to the SCIENTIFIC AMERICAN. Here, to his surprise, he finds spread before him a wonderful variety of photographs of neatly constructed dwellings, with the plans. First he runs over the most economical houses, those for six hundred, twelve hundred or two thousand dollars. He studies the plans carefully, makes himself familiar with the details, the forms and the appearances, which the photographic plates readily enable him to do. The good wife, the daughters and the sons, all do the same, and in the course of their searchings and studies they find their attention almost insensibly directed toward the better class of houses, of which plans and photographs are also given. And on studying these better houses, they are found to be so much more comfortable, roomy, and in every way superior that the notion of a "cheap as possible house" has vanished, and the more sensible conclusion is decided upon that "We will have the very best house our means will permit." Hundreds of architects and builders in all parts of the country can testify to this educative influence of our paper upon their customers. Many builders know by experience that by this means jobs which at first promised only fifteen hundred dollars have been raised to four or five thousand dollars.

It makes a heap of difference to an architect or a builder whether he is employed on a wretched little cheap house or on a good, substantial one. Manifestly then it is to their interest, as well as that of their customers, to have the SCIENTIFIC AMERICAN widely circulated, and its photographic pictures and plans brought everywhere to public notice. Every architect and every builder can do something to aid this good work. Talk about it to friends and customers. Get them to subscribe. It costs only $2.50 a year. It is the cheapest, finest, and most useful architectural work ever produced. Every number is intrinsically worth more than the price of the year's subscription. Where can a builder find in one number a dozen plans of attractive new houses, with spendid plates in colors, for $2.50? They are not to be had except in the SCIENTIFIC AMERICAN, and for the money stated, instead of one number, we give a year's subscription. We say specially to architects and builders, you were never before supplied with a paper that did you so much good, that tended so much to help you to business and to profitable contracts, as the SCIENTIFIC AMERICAN. We therefore ask you to do all you can for us. Remember, the more subscribers we have, the more we can beautify and improve our publication, and thereby increase your advantages.

CHURCH AT AUBURN, CAL.

Our engraving, for which we are indebted to the California *Architect and Building News*, shows an attractive and economical church for a country village. Architects Mooser & Cuthbertson. Cost, $5,000. The main portion or principal auditorium is 66 ft. long by 45 ft. wide, and has a sitting capacity of 450.

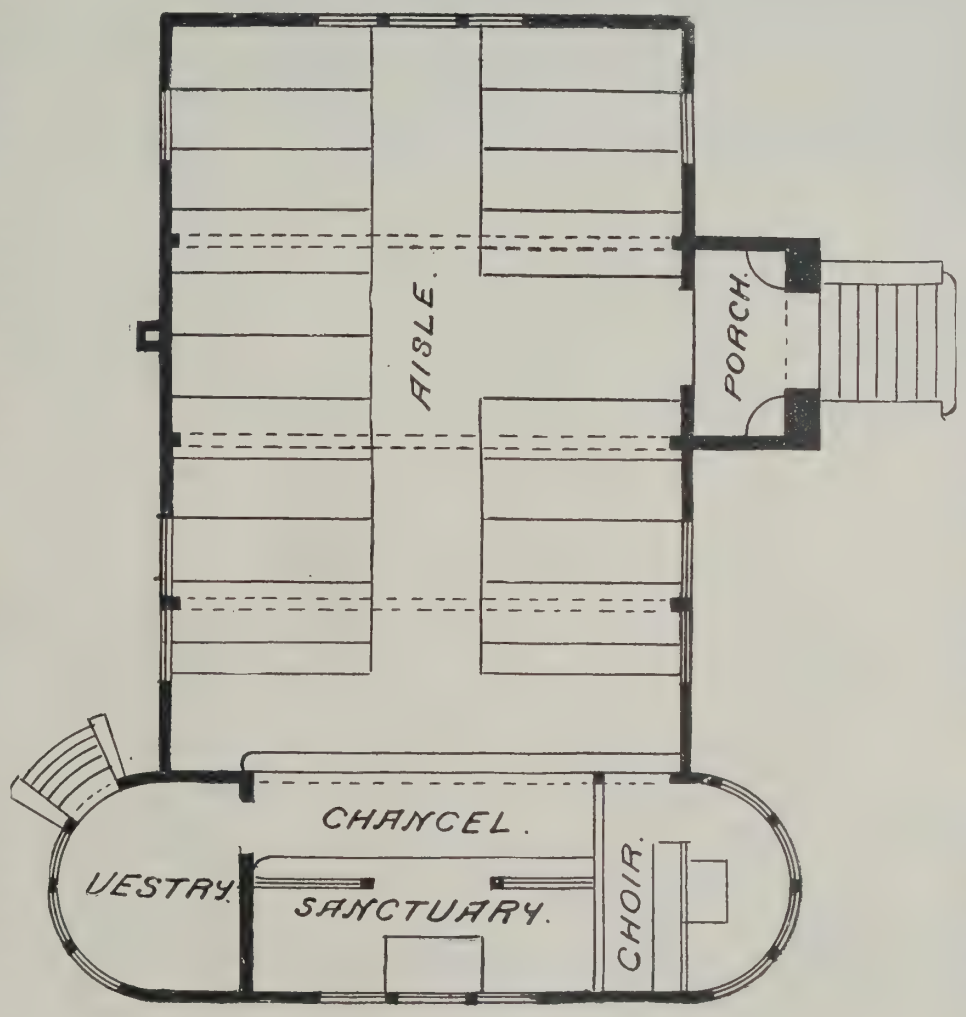
A COTTAGE IN BUENA PARK, CHICAGO.

In this issue, on page 91, we publish two floor plans and a photographic view, taken specially for the SCIENTIFIC AMERICAN, of the cottage of Mr. T. B. Dohan, which is situated at No. 206 Evanston Avenue, Buena Park, close to the lake, of which a view may be had from the rear of the house. It is cellared throughout; the basement being brick 12 in. thick. The first story frame, covered with clapboards, and the second story and roof are shingled. The porch to the main entrance is 3 ft. 6 in. from the ground, and forms a very pleasant veranda. The parlor is 19 ft. 6 in. by 20 ft. 6 in., and is well lighted from a bay window, on the side, and an alcove window looking on to the front lawn. It has communication with the library by a portiere, and is also entered direct from the main hall. The library is 14 ft. by 20 ft., has angle fireplace, and mullioned window. It is entered either from the dining room or parlor. The dining room is 14 ft by 14 ft. 3 in., and has large bay window extending the whole width of the room, also open fireplace. It is entered direct from the hall, and also communicates with the library and kitchen. The kitchen is 12 ft. by 12 ft., and contains range and all modern conveniences, and has pantry and closet attached; it connects with the dining room, and, by a vestibule, with the rear porch. There are five bed chambers on the second story, also toilet room, with all conveniences. The cottage is estimated to cost $4,500.

Our engraving was prepared direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.



EPISCOPAL CHURCH, AUBURN, CAL.



PLAN OF CHURCH.

Setting Back Houses in New Streets.

An interesting question was raised the other day in the Queen's Bench Division, before Lord Coleridge and Mr. Justice Wills, respecting the application of a builder to erect a house in a new street at Middlesbrough. A plan was first sent in which showed the house set back 30 ft., in a line with two houses in an old road which was a continuation of the new street, but afterward he altered his mind and sent in another plan showing the house not set back, which the corporation disapproved of. Thereupon the builder applied for a mandamus to the corporation to approve the plan. It was in answer to this writ that the corporation had to deal. Under the act of 1888 there is an enactment to amend section 156 of the Public Health Act, which runs as follows: "That it shall not be lawful in any urban district, without the written consent of the urban authority, to erect or bring forward any house or building in any street, or any part of such house or building, beyond the front main wall of the house or building on either side thereof in the same street, nor to build any addition to any house or building beyond the front main wall of the house or building on either side of the same."

The street at Middlesbrough had only a few houses at considerable distances apart, and the question was how the above provision applied in such a case, or to any new street. From the particulars before us, it appears that the corporation had laid out the new street on one of the main approaches to the town, which they desired to keep as spacious as possible. The old by-laws of the town provided for a width of street of 48 ft. In the older part of the road there are one or two houses set back 30 ft., but in the new street there was only one house built at that distance back, and it was 800 ft. away from the proposed house. Another in the old road was set back 70 ft., and this was 400 ft. away. The question was whether these houses could be taken as a guide, or as controlling the line of any new house. The amended enactment we have quoted appears to make it clear that they must be taken as defining the limit, for it says distinctly it shall not be lawful to erect or bring forward any house "beyond the front main wall of the house or building on either side thereof," clearly implying that if there is only one house on either side, and however far off it may be, it should determine the line. On the part of the builder it was argued that these were different streets, one forty years old, and one quite new, with only one or two houses built in it, and that the nearest of them was 800 ft. distant; the other was set back 70 ft.

Mr. Justice Wills said if the corporation were justified in requiring the house to be set back 30 ft., they might as well require it to be set back 70 ft. The court decided that the new road was not yet a street, and there were no houses on "either side of it," so that the enactment did not apply. The mandamus must therefore issue. The decision turned on the moot question, "What is a street?" which, until it is authoritatively settled, will give builders in newly formed streets the right to defy the urban authorities. The point, therefore, is of great importance in the new districts of towns, and it is one which requires some amendment in the act to meet the difficulty. It comes, in short, to this: that until a thoroughfare or road becomes a "street," the houses on either side, if few and scattered, do not determine the line of frontage. The meaning of the term "street," legally under the Public Health Act, "includes any highway (not being a turnpike road) and any public bridge (not being a county bridge) and any road, lane, footway, square, court, alley, or passage, whether a thoroughfare or not," a remarkable definition and of extraordinary latitude. The legal definitions given by judges are equally wide. Lord Chelmsford, in "Galloway *v.* Corporation of London," says: "The word street does not mean the roadway, but a thoroughfare with houses on each side"—a reasonably restricted definition, and one generally accepted, yet it was held by Justices Page Wood and Selwyn that, although the word "street" may include the houses fronting on a public thoroughfare, as well as the actual roadway or footways, yet the street, in the *prima facie* meaning of the word, is confined to the roadway and footways. These are conflicting dicta of the courts.

But a "street" has a beginning. At first it may consist only of a roadway, rough and unfinished, with one or two houses, and then, according to Lord Chelmsford's definition, it cannot be called a street. How many houses are necessary to be built to entitle it to the name of street? For the purposes of the act a prospective meaning should be understood; but the line of houses ought at least to be determined by the authority, and if only one house is erected that is set back, they ought to be able to require that new erections conform to the same line. On what other ground can we expect uniformity or compliance with the act? If the dictum is to be accepted that a new road with one or two houses in it is not yet a street, and that if houses "on either side" is meant to mean those immediately adjacent, we are obliged to arrive at the conclusion that all unfinished roads are not streets, and that a builder can erect his houses as near as he likes to the roadway. But this difficulty could not occur if properly defined lines were laid down on the plans of new roadways sanctioned by the authority. The unfortunate rule whereby the "written consent" of an authority is required leaves the door open to many maneuvering builders, and as we have pointed out in other cases, it may be sometimes so relaxed as to afford no protection to the public, and may reduce an act to mere useless form in the case of those who will take the trouble to evade it, and have the boldness or effrontery to defy the authorities.—*Building News.*

A SUMMER COTTAGE AT GRAND POINT, MICH.

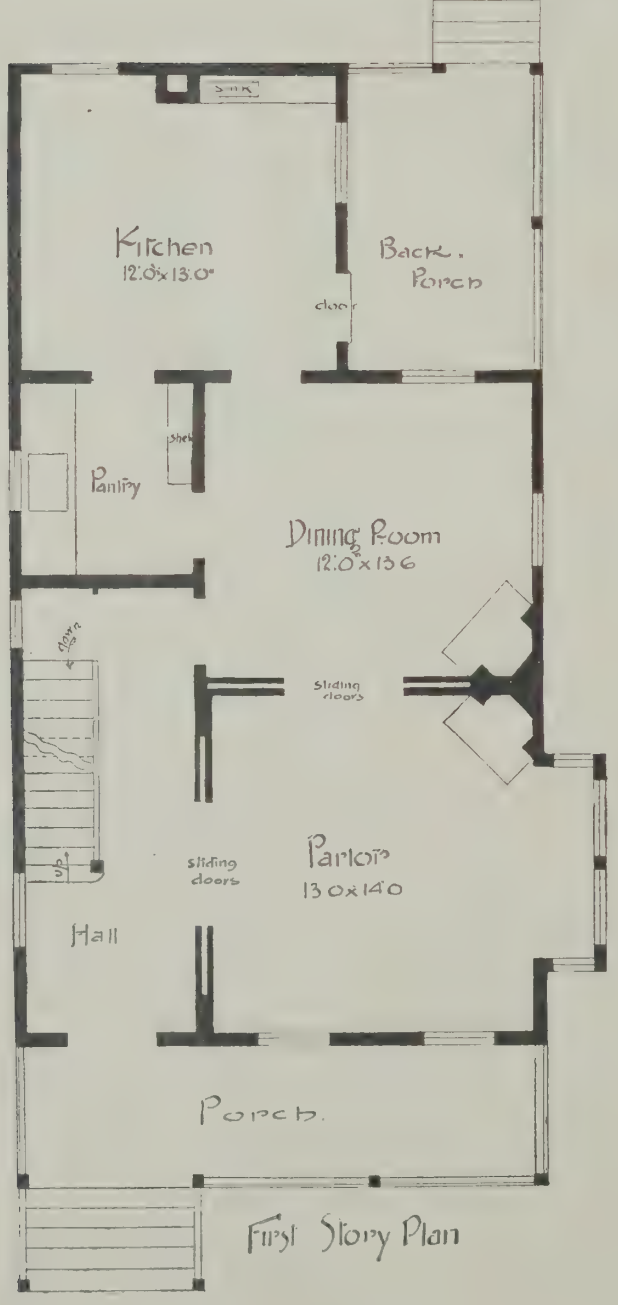
One of our plates in colors this month shows a cottage recently erected for Mrs. M. Hutchinson, of Detroit, at Grand Point, Mich., from plans furnished by Munn & Co., New York. The house was built complete at a cost of twelve hundred dollars, and was erected and occupied within six weeks after the delivery of the plans to the builder. The house is plastered throughout with adamant. On page 98 will be found a sheet of details, specially useful to the builder. This design has met with very general favor, and has been extensively copied. We have heretofore published modified examples of the same. The present illustrations show improvements which render the plans still more desirable. The liberal piazza on three sides of the house is a particularly desirable feature.

Our picture was made direct from a photograph of the house taken specially for SCIENTIFIC AMERICAN.

We have in preparation, for issue during the forthcoming year, a number of tasteful designs for cottages and economical buildings of various styles.

"I WAS always under the thumbs of the architects," said a builder recently, "until I took the SCIENTIFIC AMERICAN. In the second number I found the perspectives and plans for a house which so tickled my customer that he gave me orders to build nine of them at once, on which I made handsome profits. The $2.50 a year I pay for the SCIENTIFIC AMERICAN is a constant bonanza for me. With its aid I now do my own architecturing."

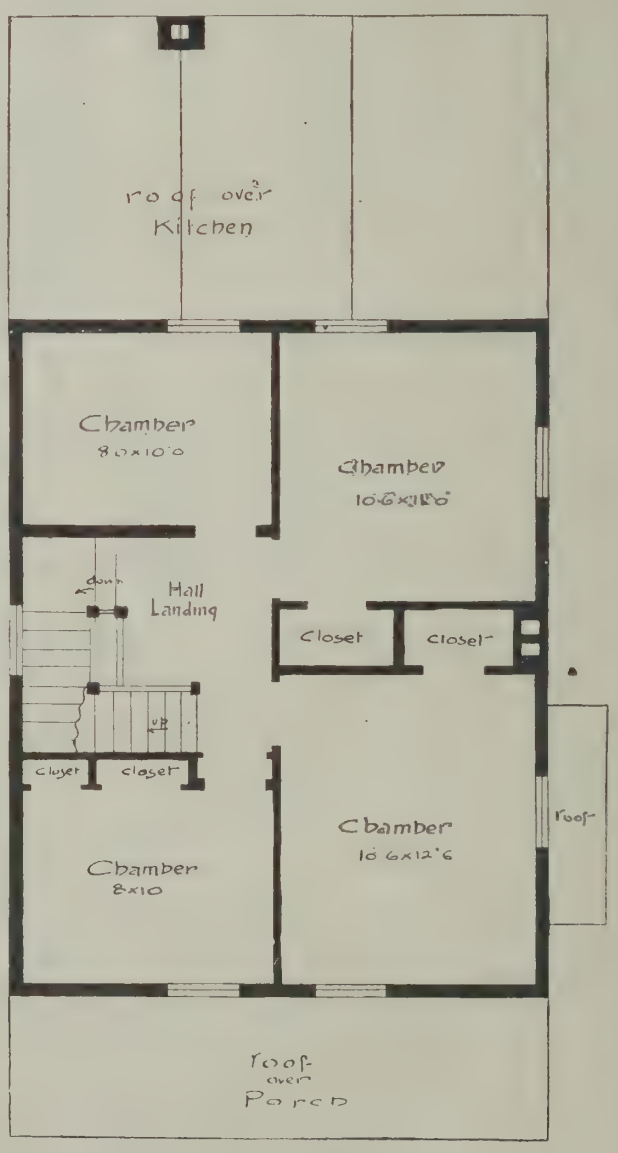




First Story Plan

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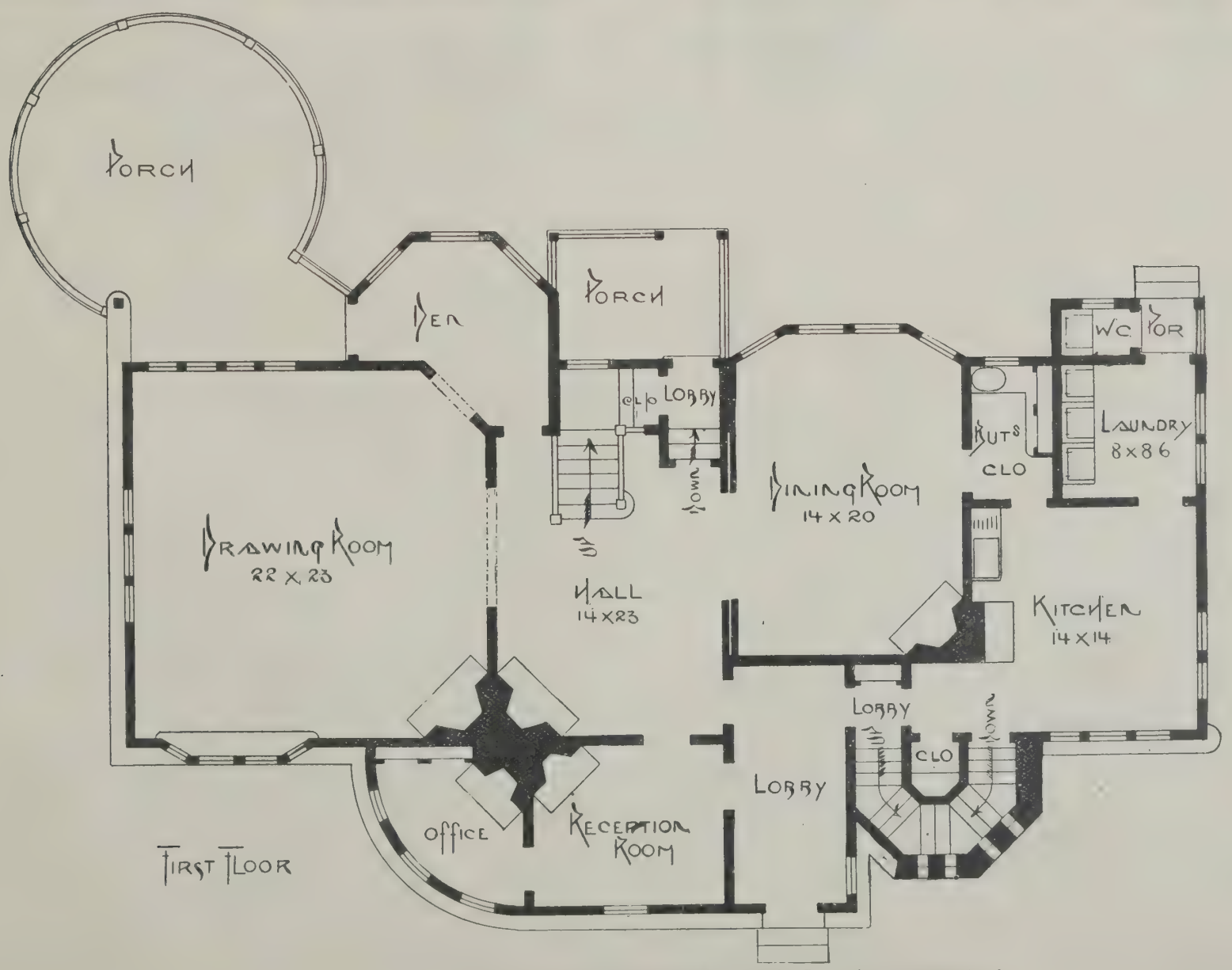
[See page 90.]



Second Story Plan

A Cottage West Brooklyn





A COUNTRY HOUSE AT WAYNE, PA.—[See page 90]

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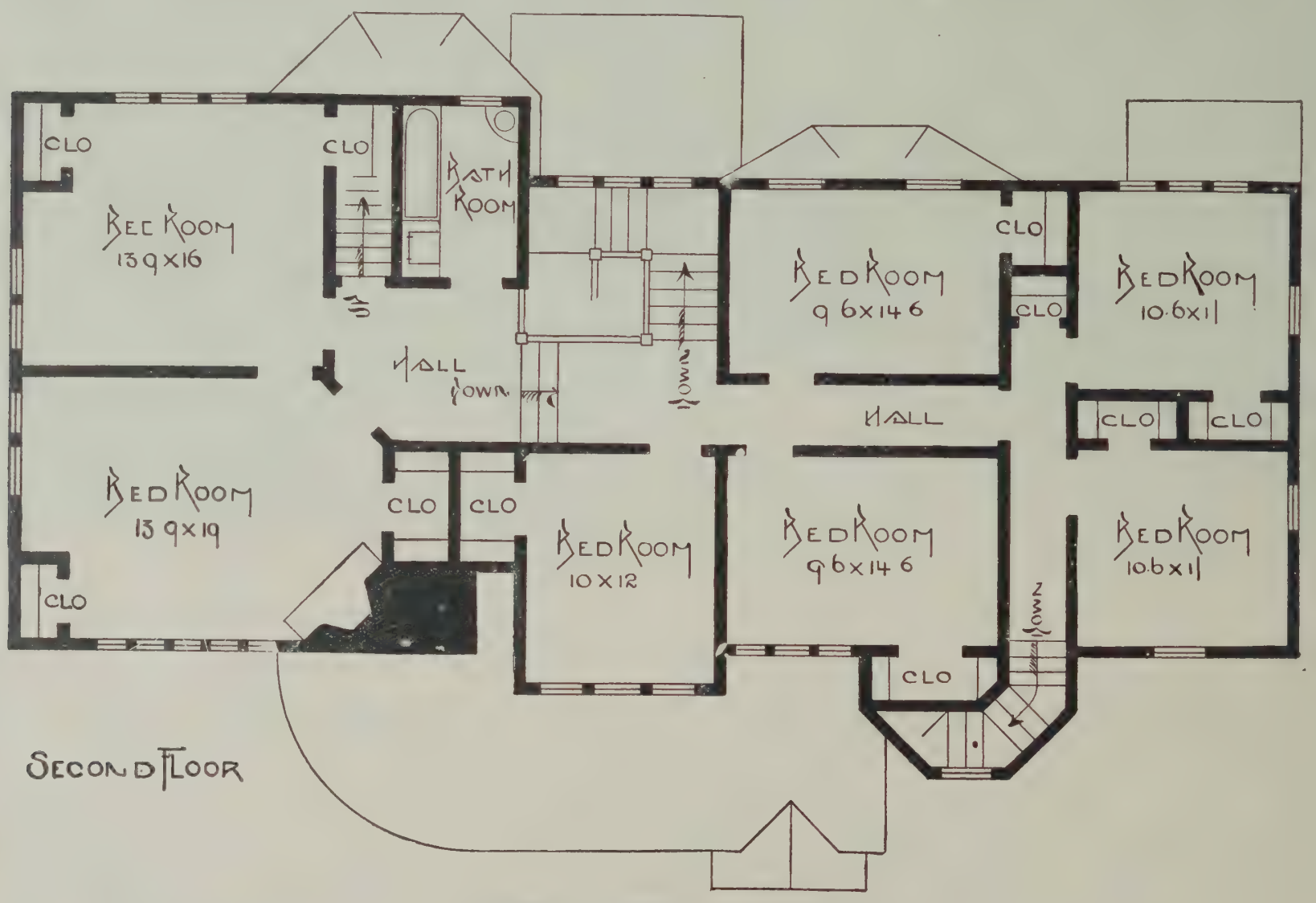
A COTTAGE, WEST BROOKLYN.

In this issue, page 88, we give floor plans and a photographic view of Mr. Hawley's cottage at West Brooklyn, New York. The cottage is built upon a lot 25 x 100. The foundations are stone, the house being cellared throughout. The first story is of frame construction covered with clapboard, and the remainder is of frame covered with shingles. The piazza extends across the front. The hall is connected by means of sliding doors with the parlor. The parlor is 13 ft. by 14 ft., and this room is connected with the dining room by sliding doors. The pantry is connected with the dining room, and kitchen also. The kitchen is 12×13, fixed with range, sink, etc. The back parlor is quite spacious. In the second story are four chambers. There are also two others. The estimated cost is $2,500. Our engraving was made direct from a photograph of the building taken specially for the Scientific American.

A COUNTRY HOUSE AT WAYNE, PA.

We illustrate on page 89 a country house erected for Dr. Chas. Davis, at Wayne, Pa., and from plans prepared by W. L. Price, architect, Philadelphia. The elevations are particularly attractive and have many pleasing bits of detail. The plans are well arranged. Dimensions: Front, 68 ft; side, 43 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft. Underpinning to sills of first story windows is built of field stone laid at random, and the rest of first story is covered with narrow framing filled in between with plaster work with splashes of pebbles, etc. Second story and roof are covered with shingles and painted red. Hall, drawing room, and dining room are trimmed with antique oak, and each has panneled wainscoting. Hall has ceiling beams, a large open fireplace built of stone, with a carved oaken shelf, and an ornamental staircase with stained glass windows on landings. Other fireplaces have tiled hearths and elegant hard wood mantels. The wall in drawing room is rough-coated and painted in a dark shade of yellow and brown. Reception room (10×12) and office are finished in ivory white and a delicate shade of pale green. Dining room walls are rough-coated and painted a soft brown. Kitchen, laundry and pantries are wainscoted and trimmed with white pine, finished in hard oil. Seven bed rooms and bath on second floor, all trimmed with white pine, painted in various colors. The bed rooms are amply provided with closets, and the bath room is wainscoted and provided with all the best improvements. Ample storage room in attic. The house is glazed throughout with small beaded glass, and is provided with a furnace, range, gas, electric bells, etc. Cost $9,000 complete.

Our engraving was made direct from a photograph of the building taken especially for the Scientific American.



A COUNTRY HOUSE AT WAYNE, PA.

A RESIDENCE AT GRACELAND, CHICAGO.

We publish on page 92 a photographic view of Mr. James Treadway's residence at Graceland, Chicago, taken specially for the Scientific American, also two floor plans. The house is situated on Alexander Avenue. The main hall is entered through a handsome porch 2 ft. 11 in. above the grade line, and to the left it opens into the parlor, which measures 14 ft. by 14 ft. 6 in., and is lighted both from front and side by single windows. This room also opens into the dining room, which measures 13×19, and is entered either from the kitchen direct, or the hall, or the parlor behind which it is situated. The library is octagonal in shape, is on the opposite side of the hall to the dining room, and has angle fireplace. It measures 13 ft. 6 in. by 15 ft. 6 in. and has large bay window the full width of the room. The kitchen is directly behind the dining room and measures 12×14, being fitted with every convenience. There is a veranda at the back running the full width of the house. On the second story there are four bed chambers, the front chamber having pretty alcove windows, also toilet room fitted with every convenience. A very pretty feature is the front attic window, which is a recess casement. The house is of frame construction throughout. The estimated cost is $4,000.

A RESIDENCE AT AUBURN PARK, CHICAGO.

We publish on page 93 a photographic view and two floor plans of the residence of Wm. Roulet, Esq., No. 7726 Dickey Street, Auburn Park. The house is pleasantly situated, being set back from the road and surrounded by lawns and shrubs. A piazza extends from the principal entrance on the front half way round the side 4 ft. 8 in. above the grade line. The front entrance opens into a hall 13·6 by 18·6, which contains fireplace, handsome oak staircase and alcove "nook" with seat. The parlor measures 16 by 18 ft., and opens off the hall to the left, by portieres. It contains handsome angle fireplace and bay window. The dining room is situated at the rear of the parlor, measures 11·6 ft. by 16 ft., contains angle fireplace and is lighted from mullioned window.

The library is placed abreast of the dining room, and measures 15 ft by 17 ft., and is lighted by large bay window. The kitchen is at the rear of the dining room and is 15 ft. by 16 ft. It contains range, sink, etc, and back stairs. There are five chambers on second floor, with closets and toilet room. The basement and first story are of rock-faced stone and the upper portion of frame construction. The total cost is estimated at $7,000.

Our engraving was prepared direct from a photograph of the building taken especially for the Scientific American.

A French scientist declares that the domestic cats of the world carry at least 30 per cent of the common contagious diseases from house to house.

COUNTRY HOUSE AT NARBERTH PARK, PA.

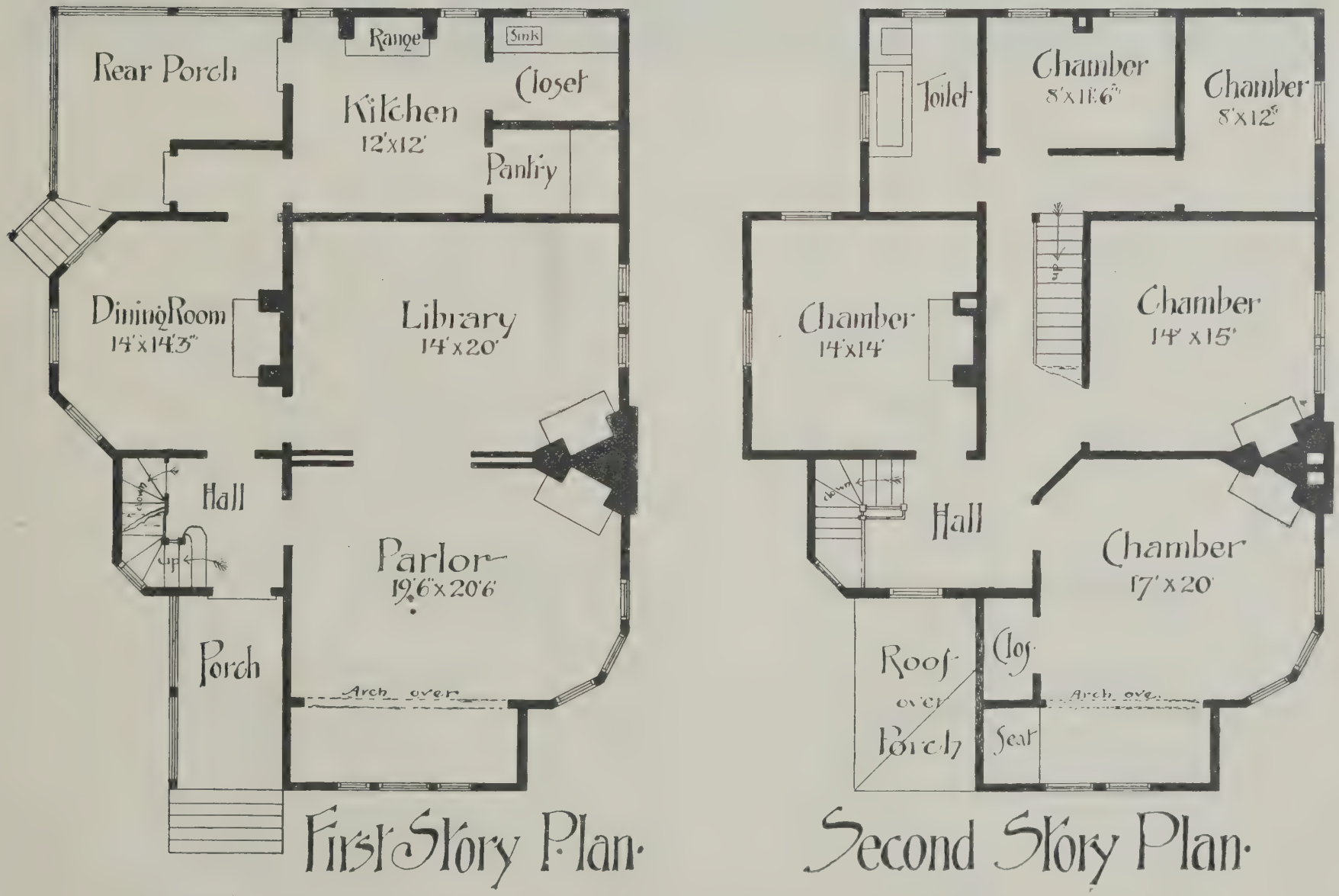
We present illustrations on pages 96 and 97 of a country house erected for Mr. Cristie at Narberth Park, Pa. The dignified exterior of this house is very attractive, and the other elevations not shown are equally as pleasing. The floor plans present a convenient arrangement of rooms, a spacious piazza, etc. Dimensions: Front 43 ft., side 53 ft. 6 in., not including piazza. Height of ceilings: Cellar 8 ft., first story 10 ft., second 9 ft., third 8 ft. 6 in. Underpinning and first story are built of rock faced stone, second and third stories of wood covered with shingles painted pearl gray, with bottle green trimmings. Roof covered with Bangor slate. Vestibule and hall are trimmed with ancient oak, and each has hardwood floors and a paneled wainscoting. Hall also contains an elaborate staircase, with carved newel and candelabra. The windows in upper and lower halls are glazed with stained glass. The parlors are trimmed with cherry, dining room with oak, and the kitchen and pantries with yellow pine, finished with hard oil, the latter wainscoted and furnished with all the conveniences. The fireplaces are fitted up in an elegant manner with tiled hearths and hardwood mantels, with beveled plate mirrors, etc. There are four bed rooms and bath room on second floor, trimmed with cherry, oak and ash respectively. Bath room is furnished in the best possible manner and is paved and wainscoted with white English tiling. Three bed rooms on third floor. There is a cemented cellar under whole of house, containing laundry and furnace. The house is provided with speaking tubes, electric bells, gas, etc. Cost $18,000 complete.

Our engraving was made direct from a photograph of the building taken specially for the Scientific American.

A flower has been discovered in South America which is only visible when the wind blows. The shrub belongs to the cactus family and is about three feet high. The stem is covered with dead, warty-looking lumps in calm weather. These lumps, however, need but a slight breeze to make them unfold large flowers of a creamy white, which close and appear as dead as soon as the wind subsides.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., Scientific American office, New York.





First Story Plan. Second Story Plan.

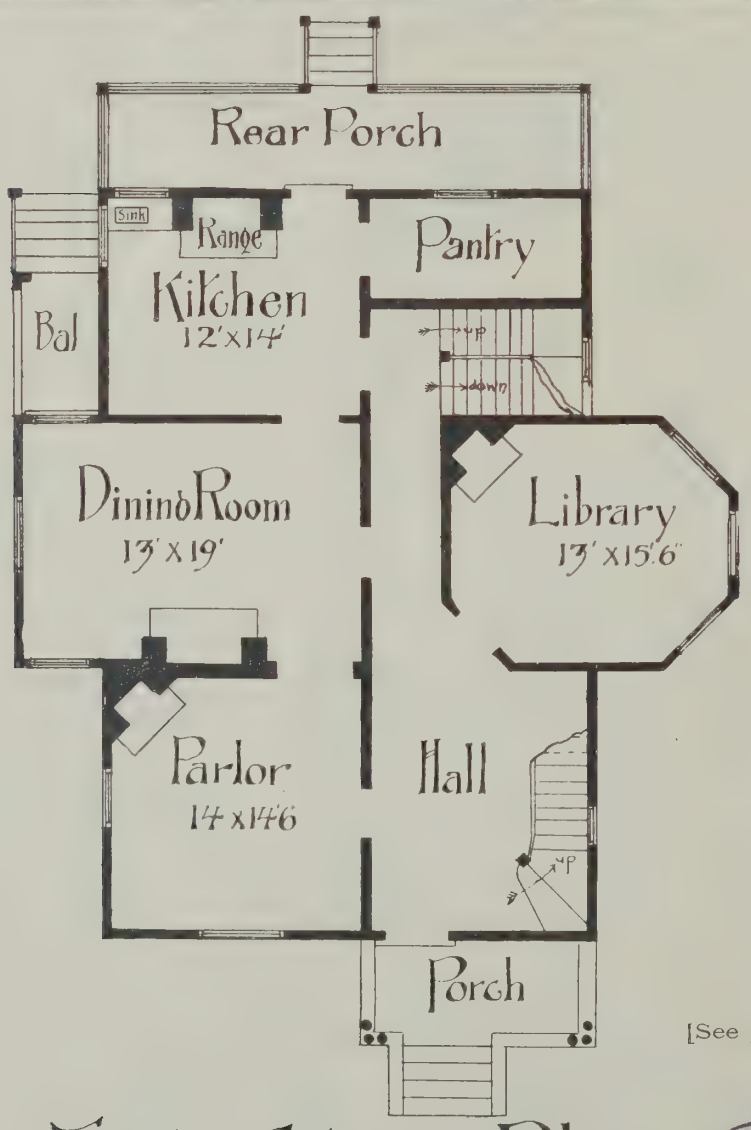
Mr. T. B. Dohan's Cottage, Buena Park, Chicago, Ill.

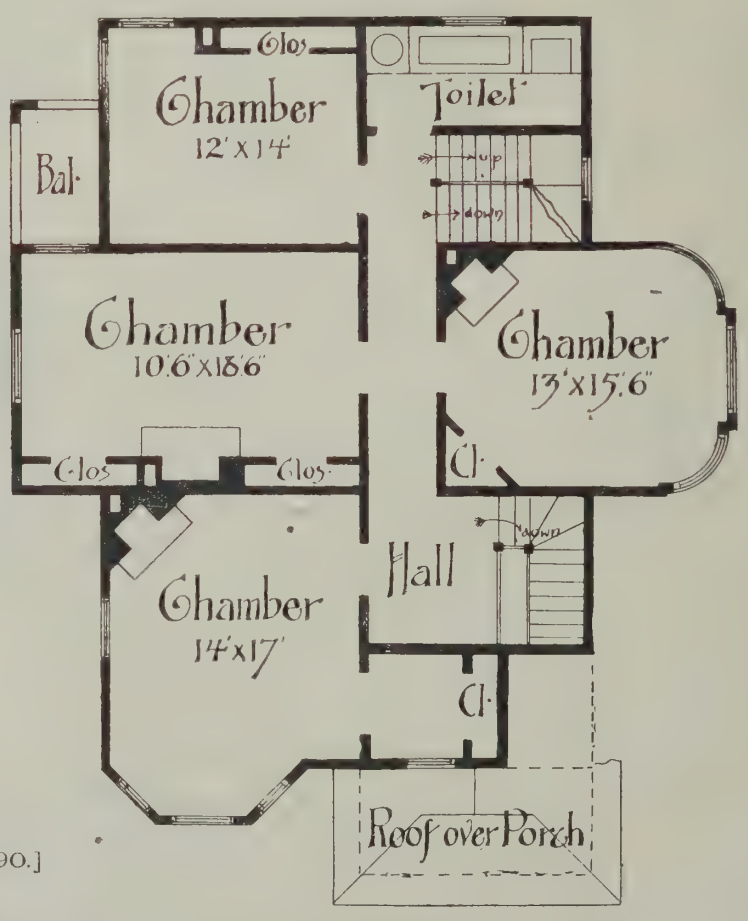
[See page 87.]

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A COTTAGE AT BUENA PARK, CHICAGO.







[See page 90.]

First Story Plan. Second Story Plan.

Mr James Treadway's Residence, Graceland, Chicago.

A RESIDENCE AT GRACELAND.

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A COTTAGE AT GRAND POINTE, MICH.



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FIRST FLOOR.

SECOND FLOOR.



A RESIDENCE AT PLAINFIELD N.J.



First Floor.

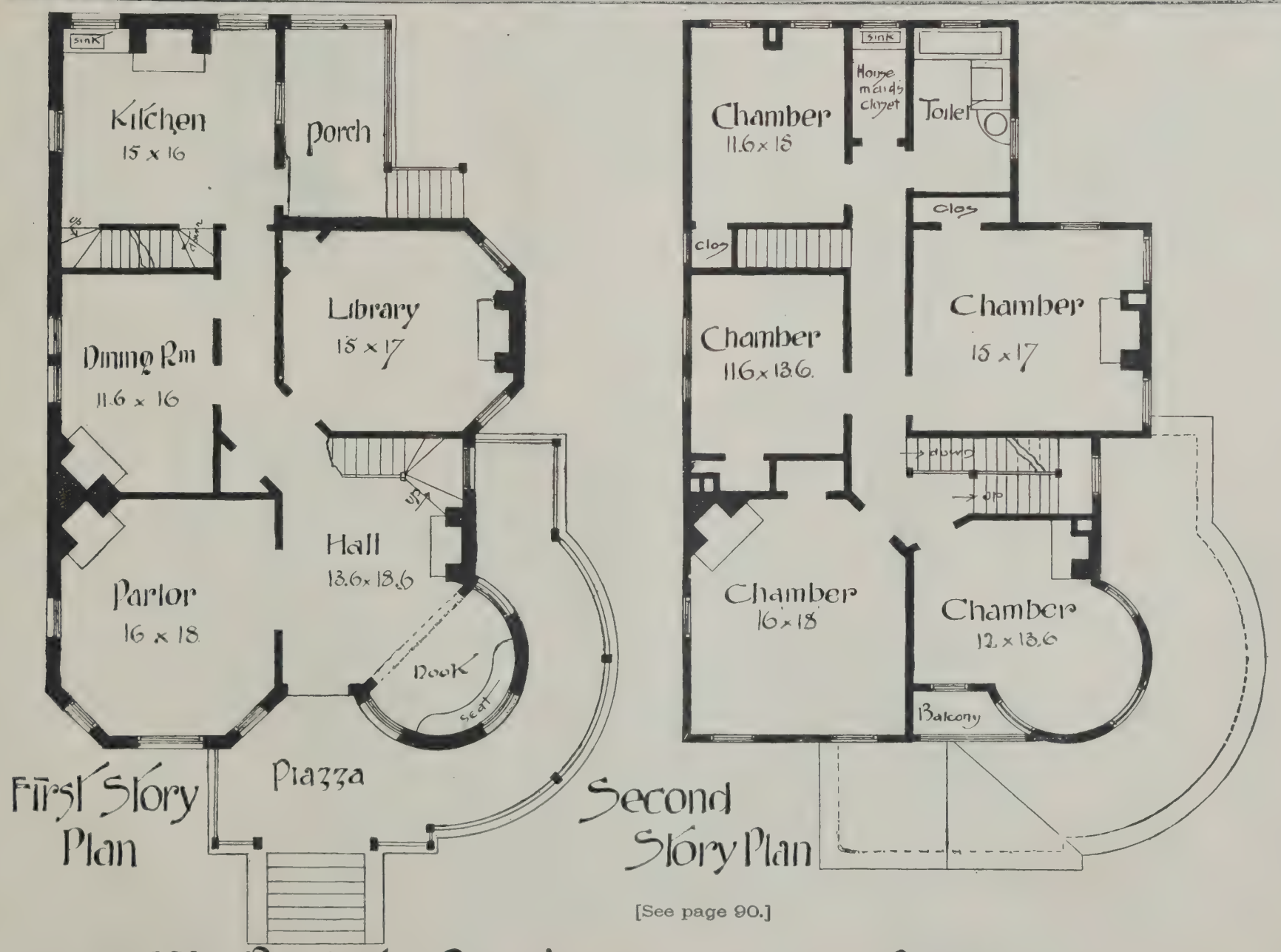


Second Floor.

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SCHUMACHER & ETTLINGER, NEW YOR

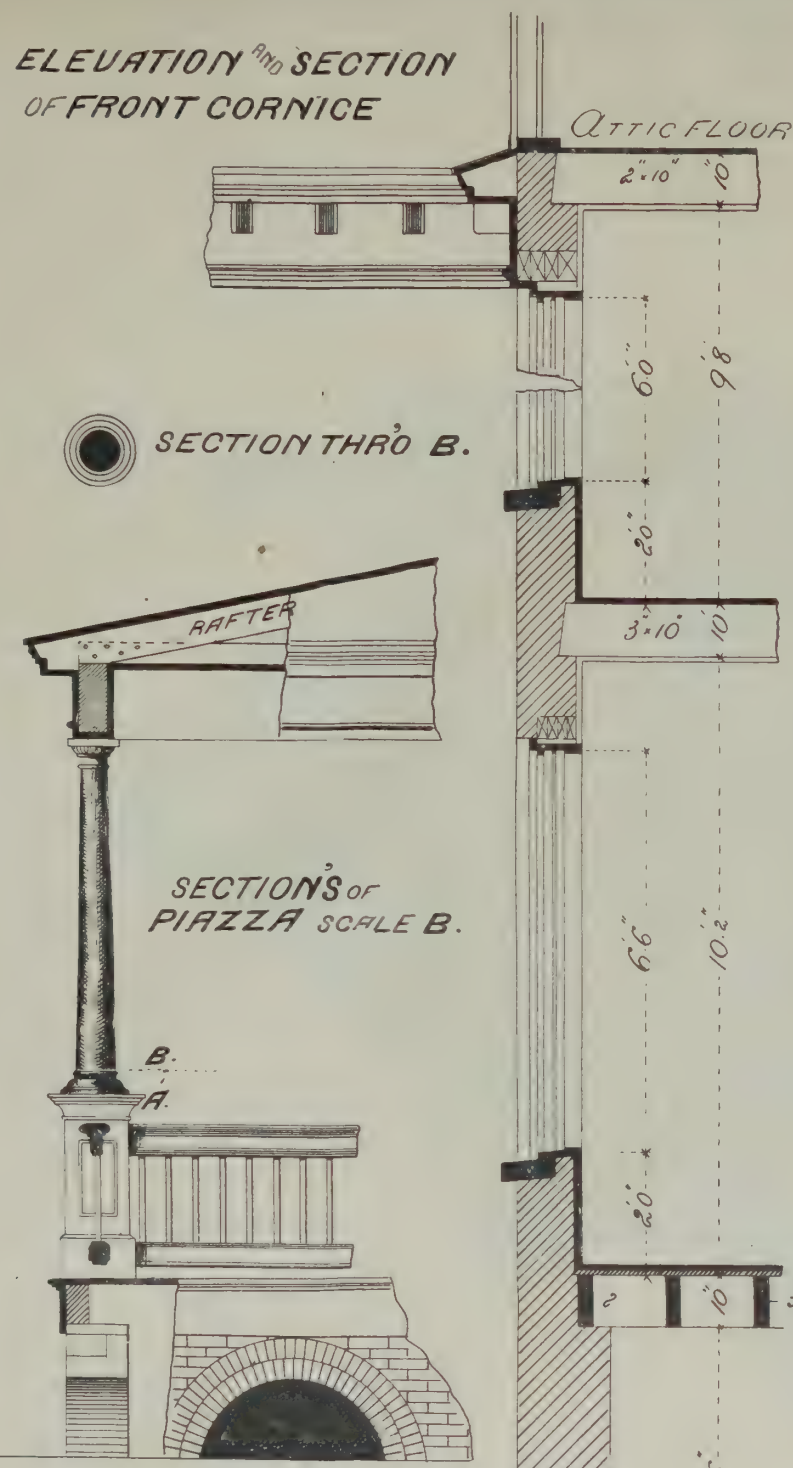


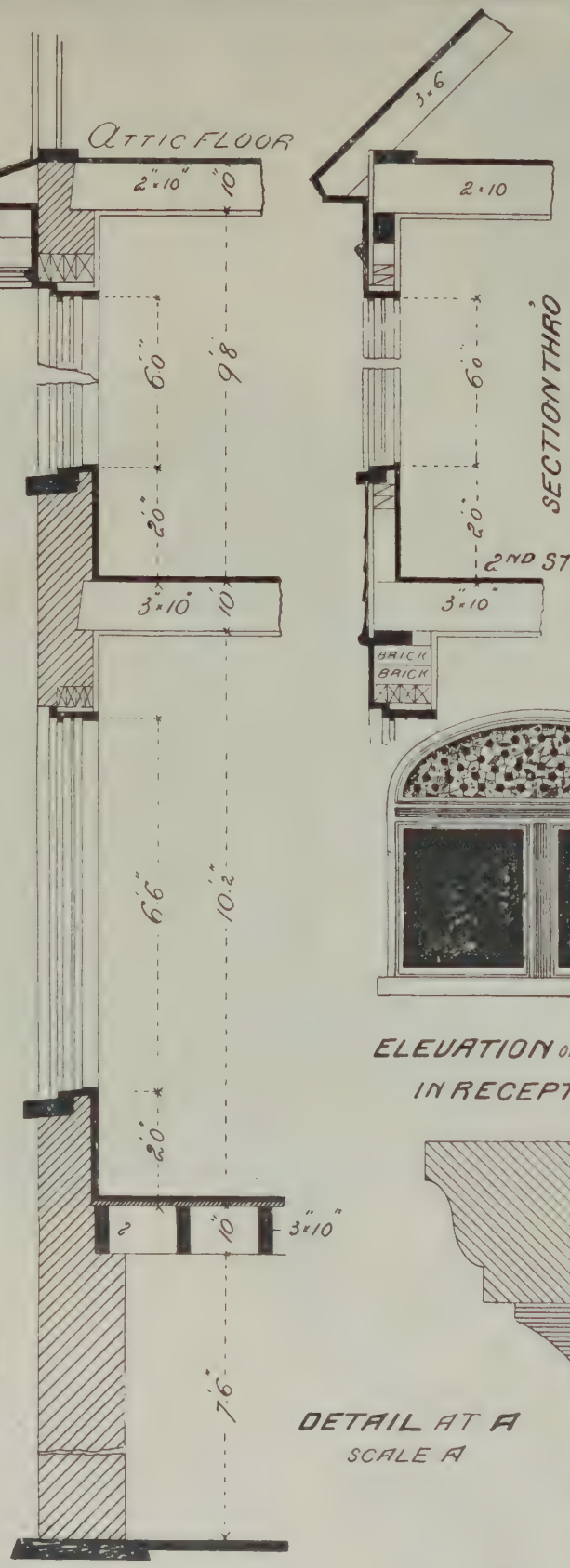


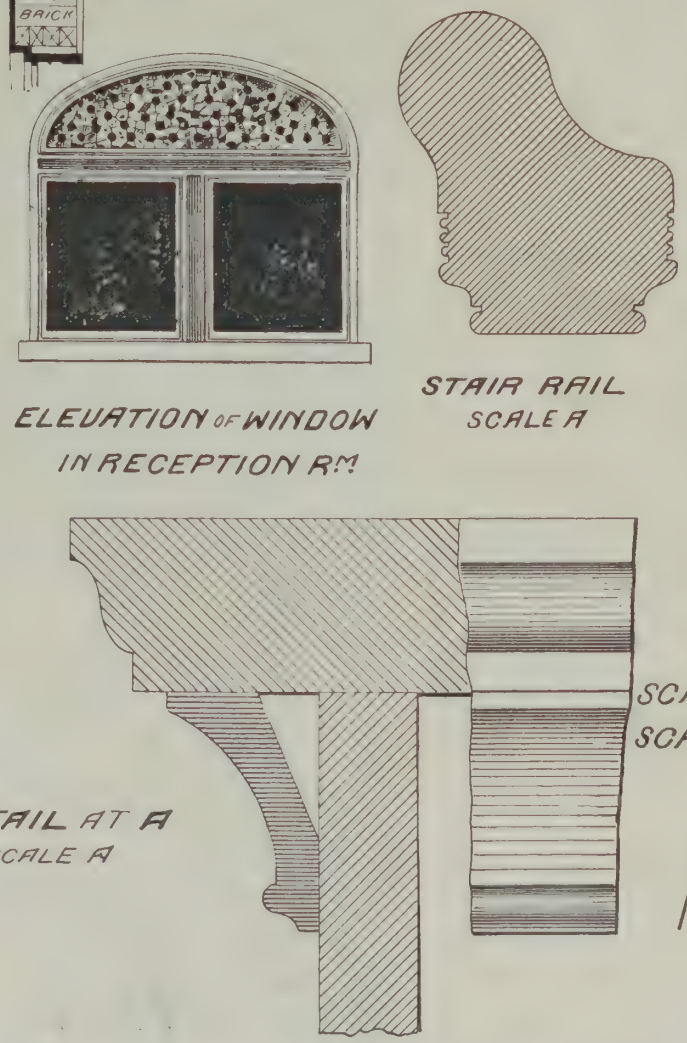
[See page 90.]

Mr Wm. Roulet's Residence Auburn Park

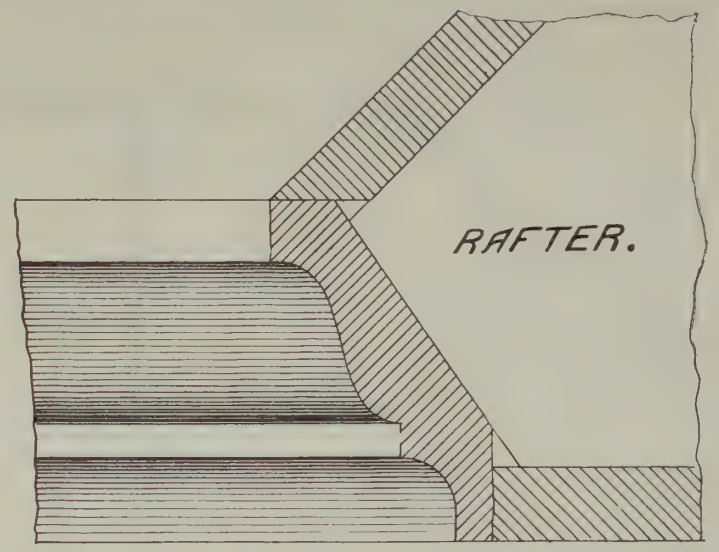
A RESIDENCE AT AUBURN PARK, CHICAGO.

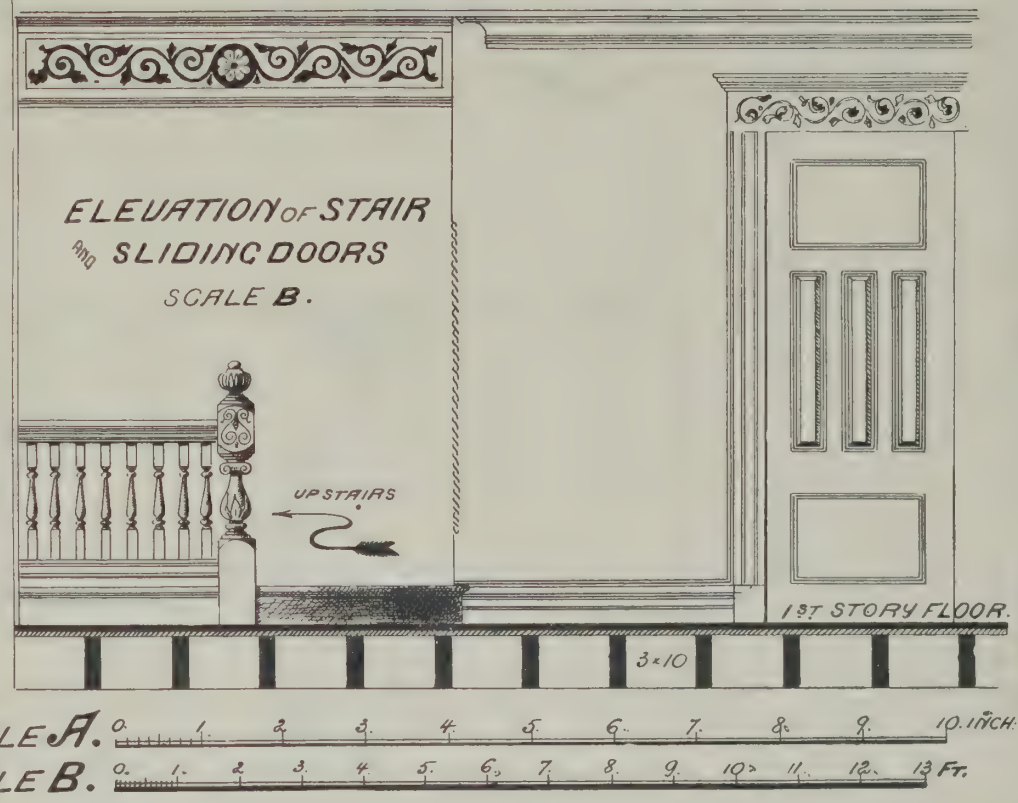












A RESIDENCE AT PLAINFIELD, N.J.

[See Colored Plate; also page 85.]

A BUNGALOW AT BELLAGIO.

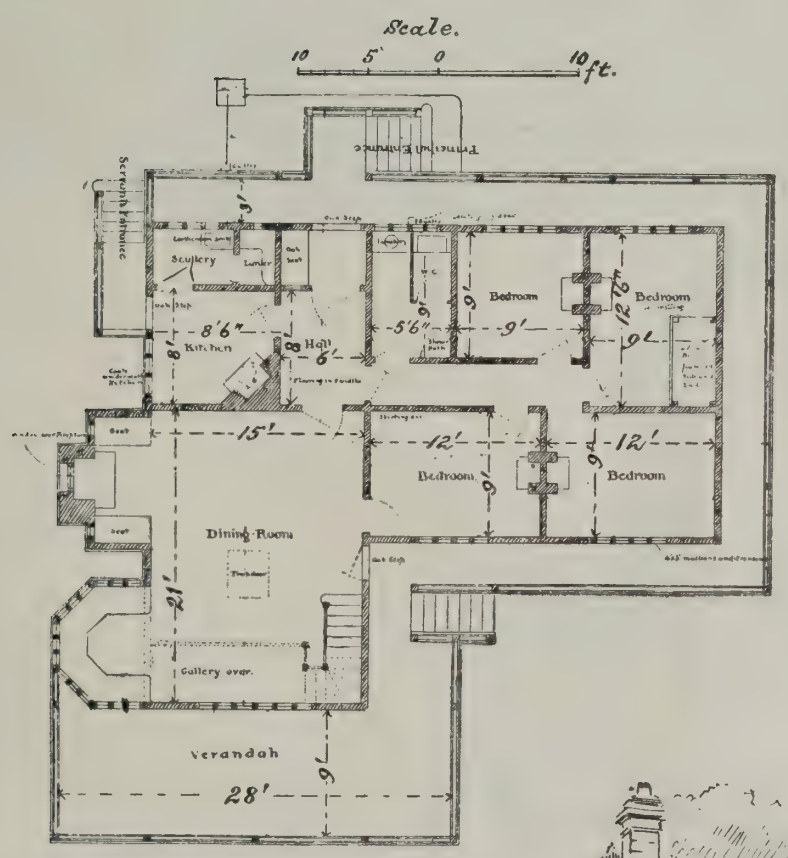
The bungalow we illustrate is not one of the most economically built, but might be carried out much more cheaply, and it is a picturesque example of the genuine bungalow type. All the living accommodation is provided on one floor, raised to the height of 10 feet from the ground, on stone basement walls which inclose space for cellarage. From the veranda, which nearly encircles the cottage, are obtained beautiful views of the surrounding country.

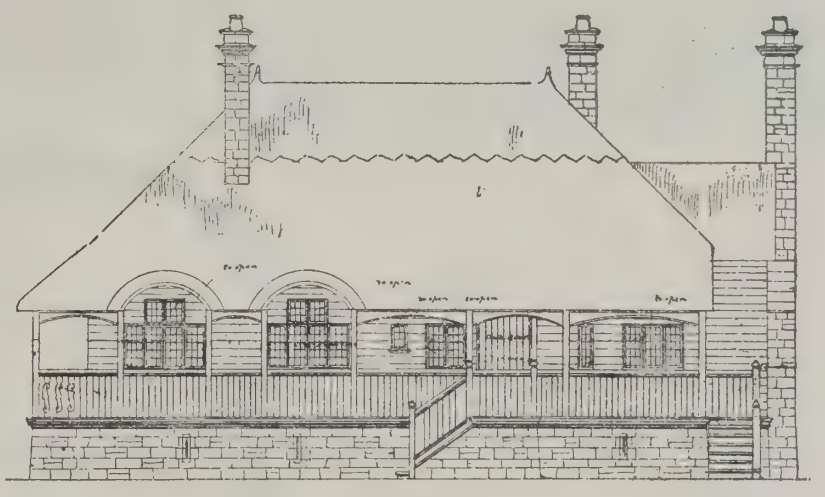
The walls to the rooms are of stud work, covered externally with Broseley tiles and plastered inside. The roofs are thatched with reeds and leather, and the chimneys are faced with stone. The dining room, with its ingle nook and bay window, has a gallery at the end, the roof being an open one with rafters showing. The woodwork to the hall and dining room is of oak stained dark, oiled and dull-polished, the rest of the woodwork showing being treated in the same manner. The windows are filled in with leaded glass in patterns, and the casements are of wrought iron, with ornamental iron handles and plates. Over the chimney opening is a window filled with beveled plate glass, from which an exceptionally fine view is obtained. Shutters are provided, and the chimney opening has a stone head with cheeks and backs covered with Dutch tiles. The two small windows at the side are filled with stained glass. The cost of this bungalow was £900, and the architect was Mr. R. A. Briggs, London. Our illustrations and the above particulars are from the *British Architect*.



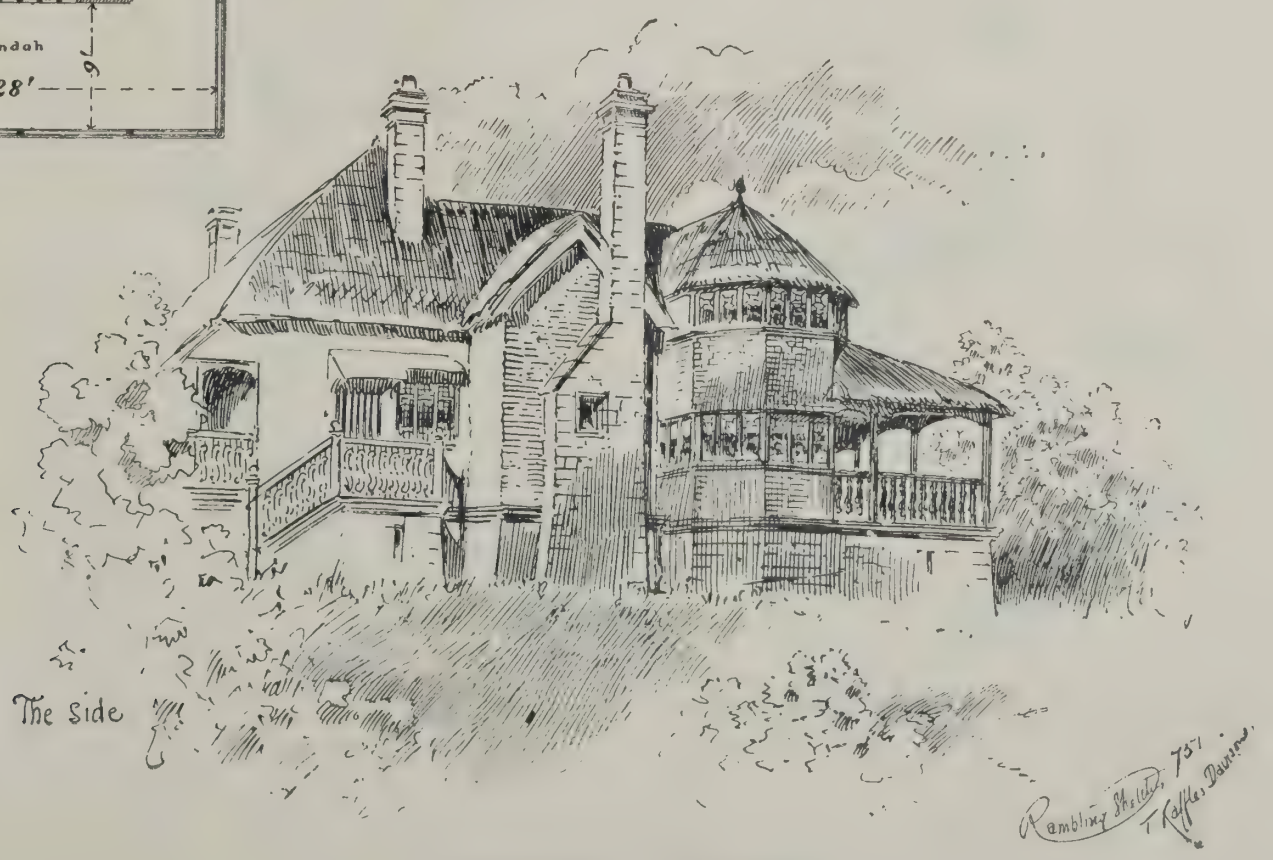
BUNGALOW AT BELLAGIO,

R. A. BRIGGS, A.R.I.B.A., Architect.



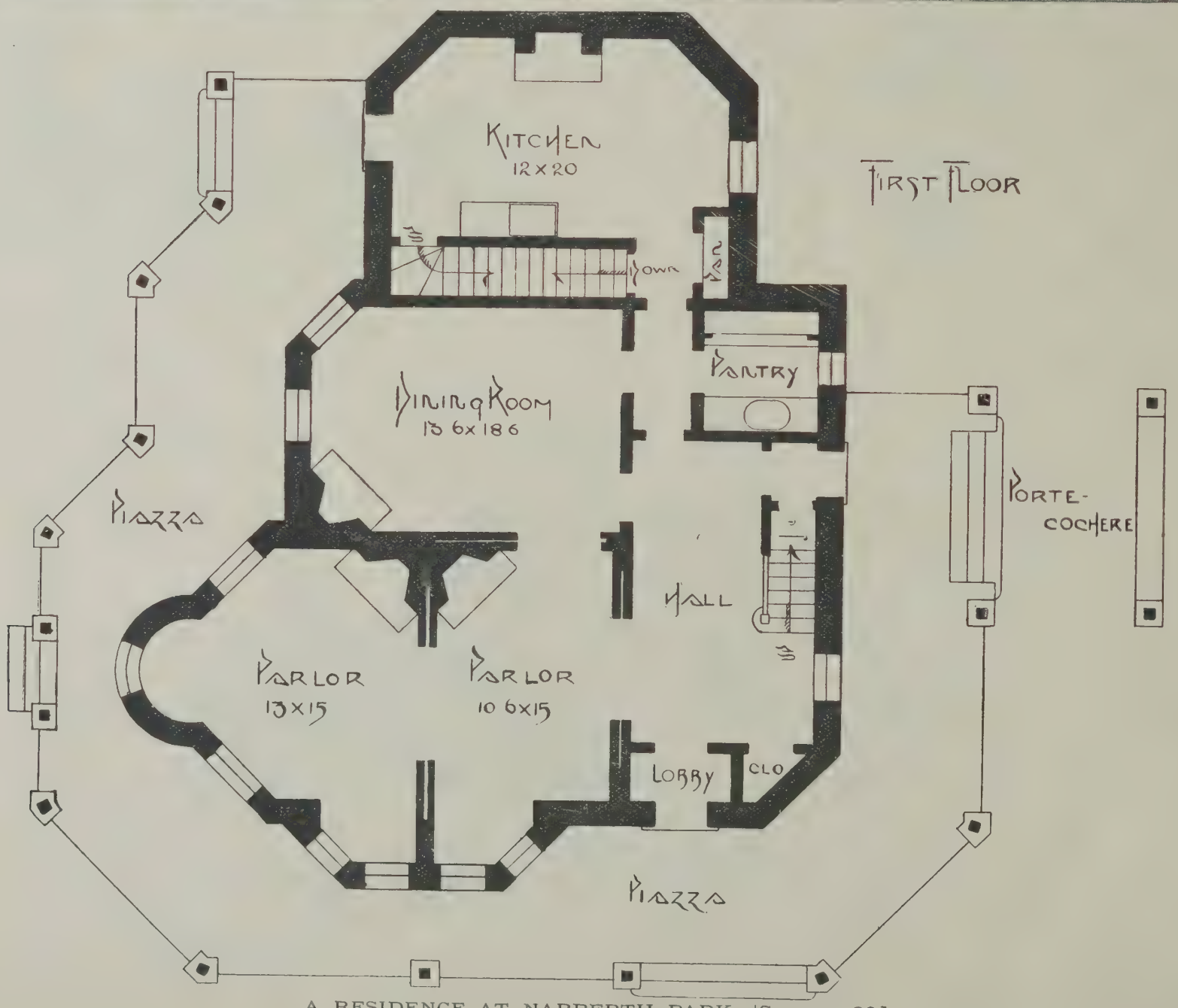


North Elevation



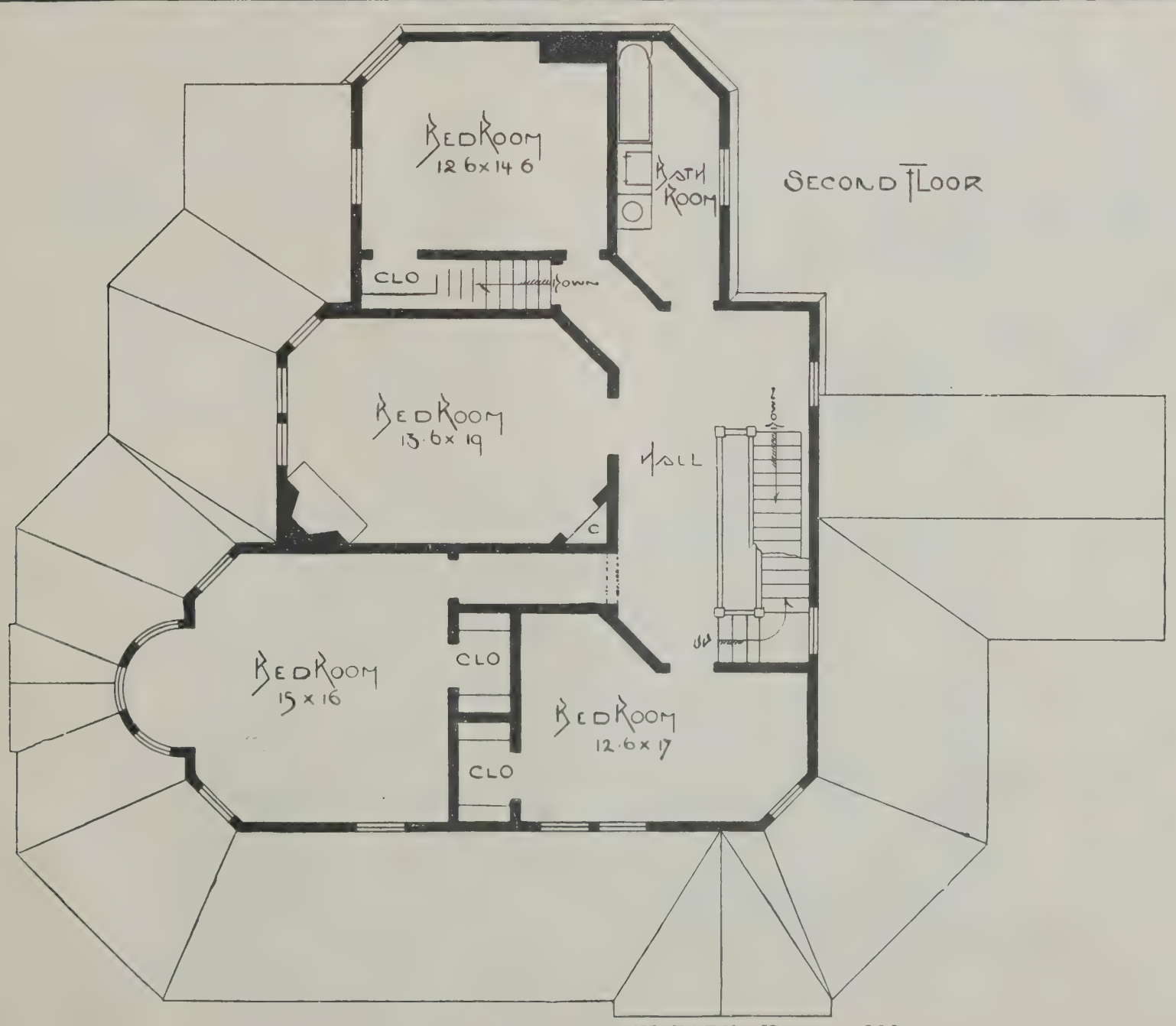
A BUNGALOW AT BELLAGIO



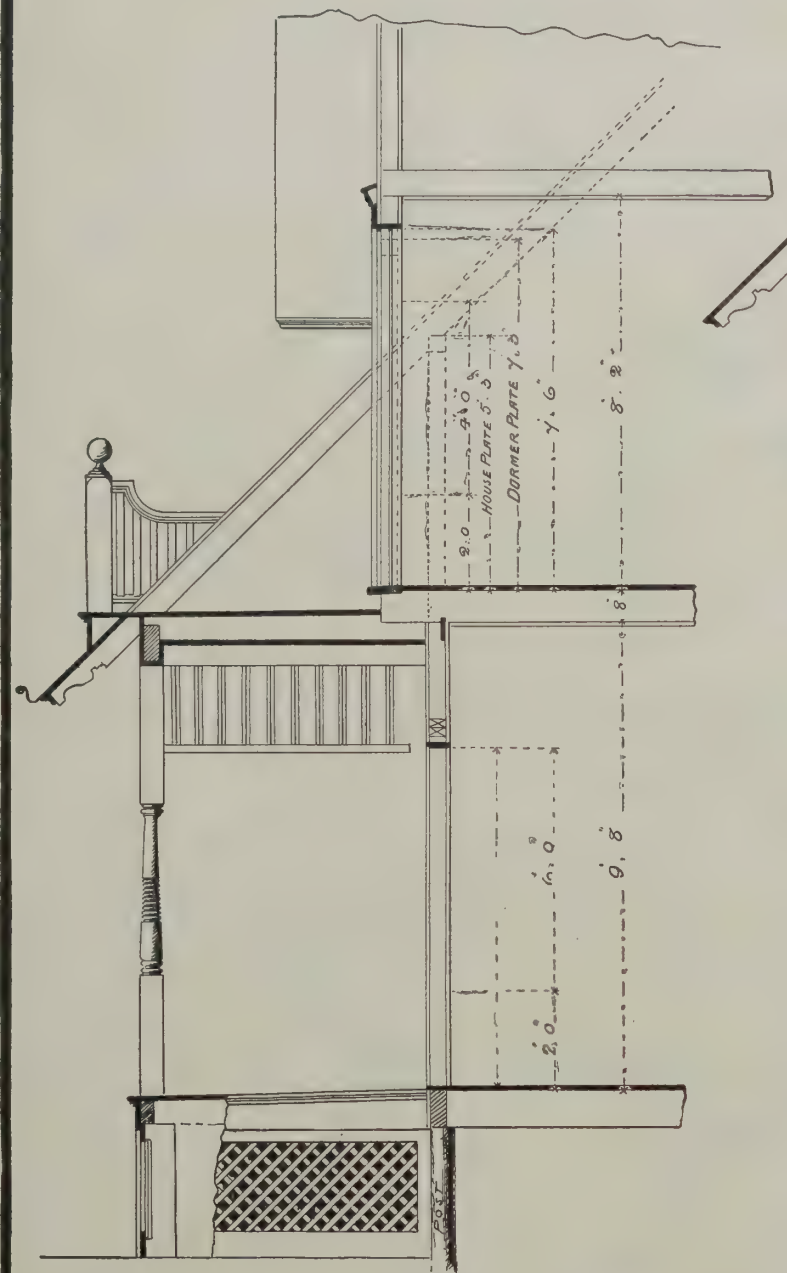


A RESIDENCE AT NARBERTH PARK.—[See page 90.]

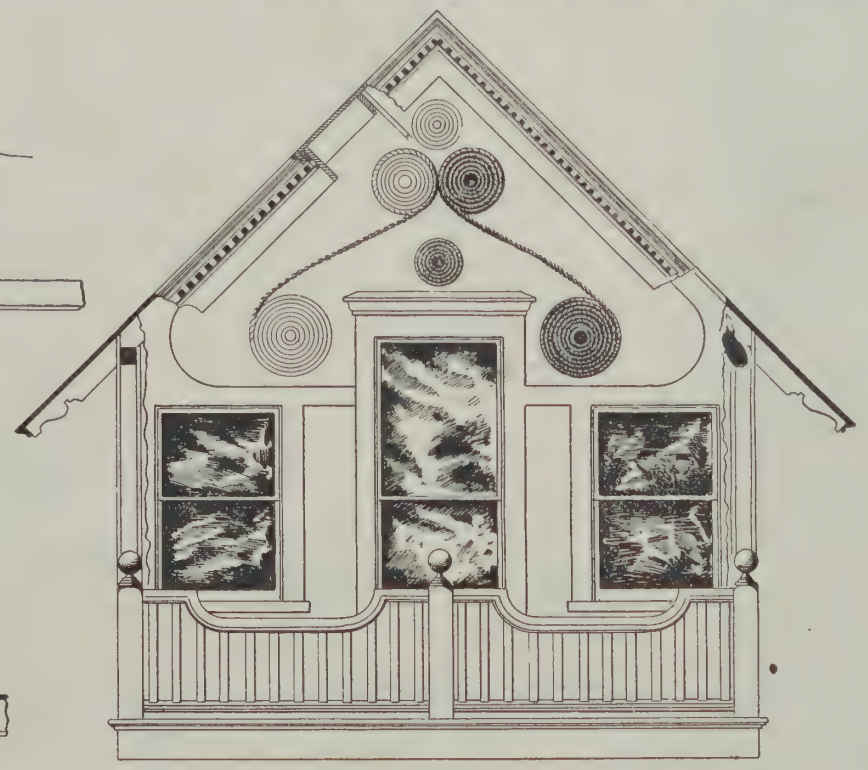




A RESIDENCE AT NARBERTH PARK.—[See page 90.]



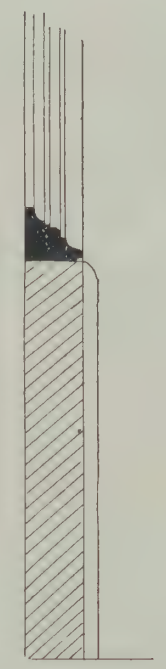
Section through Front of House, Piazza, etc.
Scale A.



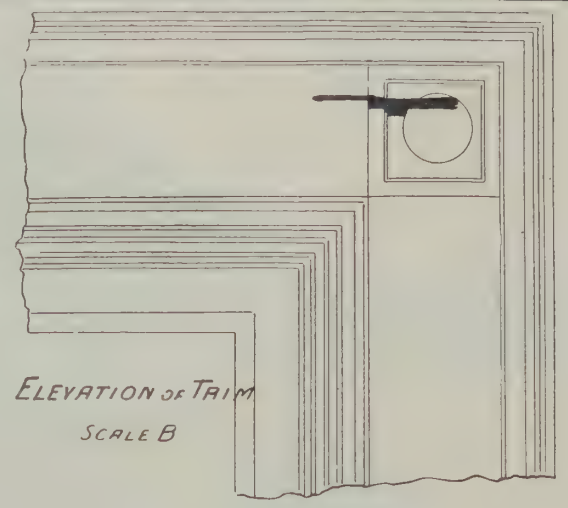
Elevation of Front Gable
Scale A.



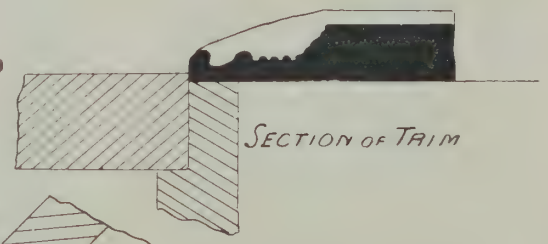
Piazza Rails. Scale B.



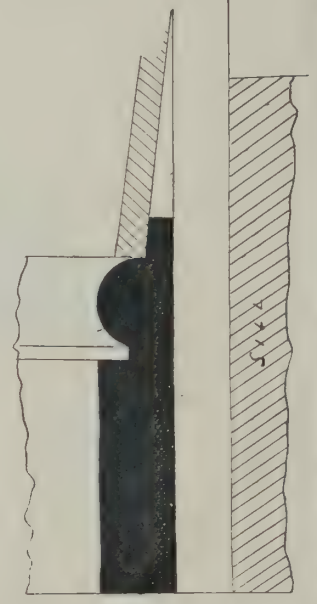
Surbase. Scale B



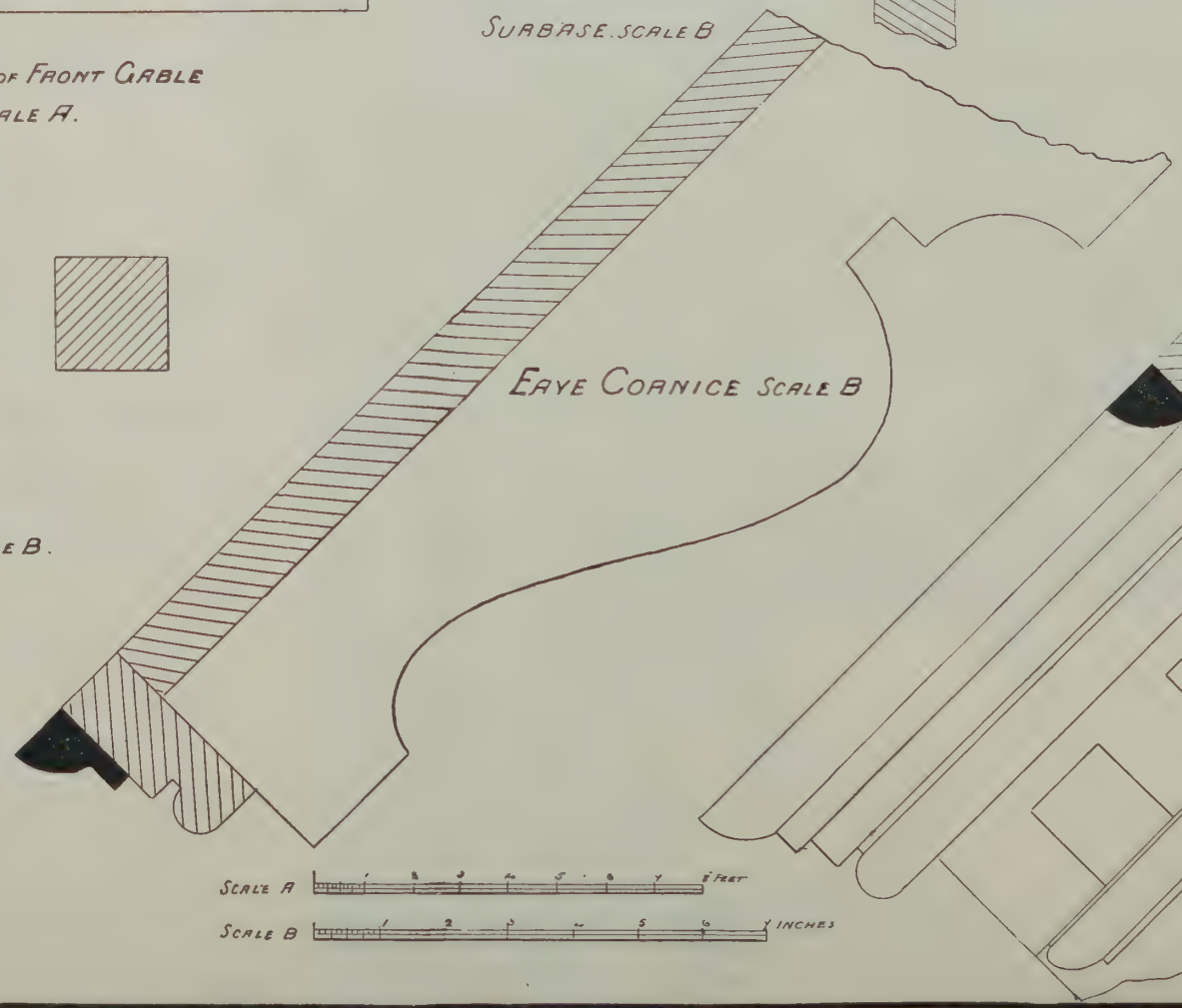
Elevation of Trim
Scale B



Section of Trim



Water Table Scale B.



Eave Cornice Scale B

Gable Cornice.
Scale B.

A Summer Cottage for $1,200.

[See Colored Plate; also page 87.]

Plumbers' Materials.

The Haines, Jones & Cadbury Co., of Philadelphia, have just published a handsomely illustrated catalogue of their sanitary specialties which is well worth the careful attention of architects, builders, plumbers, and all interested in this line of supplies. Among the articles shown, and for which prices are given, are various styles of porcelain-lined and iron baths, wash-out closets and hoppers, valve-hopper closets, flushing pipes and cisterns, different kinds of basins, open and inclosed lavatories, improved traps, etc. At their show rooms in Philadelphia are apartments fitted up with these improved appliances to show their actual working. Householders contemplating changes from old fashioned devices in their plumbing appliances, as well as other intending purchasers, should send for one of their catalogues.

"Adamant" Wall Plaster.

This already pretty well known patented cement, or artificial stone, although it is only about five years since it began to be considerably used, has in that short time been applied to hundreds of thousands of buildings. It is so infinitely superior to plaster, with the cracks and patches and general instability of the latter, that its good qualities met with prompt recognition from builders, architects, and all owners of substantial buildings, while for all descriptions of public edifices it was at once seen that it was just the article which had long been needed. It is a dry material, which will not deteriorate by age, and is shipped in bags ready for use by simply mixing with water, being applied in the usual manner. It adheres equally well to lath, brick, stone, or iron, and will last as long as the building. It becomes hard and chemically complete in a few hours, while lime and sand require the action of carbonic acid gas for many years before the lime can return to a natural state, or carbonate of lime, and no process of carbonizing lime artificially has ever been discovered. Adamant is the result of a life work of scientific research, and has gypsum for its base, from which, in the process of manufacture, the sulphuric acid and water of crystallization have been driven. Its composition is such, therefore, that upon the addition of water at the time of use a complete sulphate of lime is formed, and in a few hours after being applied it becomes very hard, and capable of thoroughly resisting all the ordinary casualties that prove so destructive to common plaster. It can be applied as well in winter as in summer, frost not affecting it, and it does not wet the timbers, thus avoiding their shrinking and swelling, while by its use the long delay ordinarily required for rooms to become fit for occupancy is made entirely unnecessary, apartments having walls of this material being ready for occupancy immediately. It has fire-resisting qualities superior to any other plaster made, is hard, tough, and elastic, and costs no more than a good three-coat lime plaster. Thirty factories, representing some $2,000,000 capital, are now engaged in the manufacture of this material, agencies for the sale of which have been established in all the principal cities.

INSIDE WINDOW BLINDS.

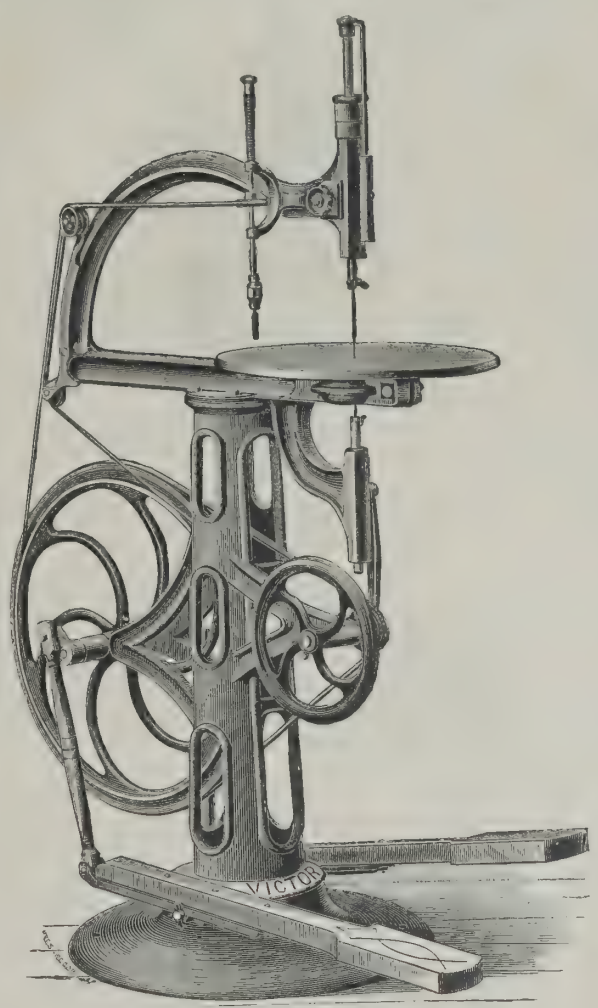
The accompanying illustration represents an apartment fitted with the inside sliding blinds and screens made by the Venetian Blind Co., of Burlington, Vt. The blind is very strong and light, being only half an inch thick. It can be closed with the window raised, and will not blow open or rattle. They are formed in compartments or sections, made to run in grooves, each section sliding past the other, with secreted springs to hold them in position at any point of elevation. They do not interfere with curtains or draperies, and by pressing the blinds to the right they can be readily removed from the sliding grooves without the use of hammer or screw driver. These blinds impart to the building a highly ornamental and complete appearance, both in the exterior and interior arrangement.

Employers' Liability and Accident Insurance.

This comparatively new branch of the insurance business is already assuming very considerable proportions, and insurance of a special class against elevator accidents has been provided within the past two or three years. The Employers' Liability Assurance Corporation, of London, England, but which has offices in all our principal cities, has thoroughly systematized this as well as other parts of their business, and now issues such insurance after taking into account the condition and pattern of the elevator, with all of its surroundings. This insurance promises indemnity to the owners of the property from loss by elevator accidents, while the public also receives additional protection from the fact that the elevators against which insurance is thus effected receive thorough and frequent inspections.

AN IMPROVED SCROLL SAW.

The machine shown in the illustration is adapted for either foot or steam power, and is designed for



THE "VICTOR" SCROLL SAW.

pattern, model, and cabinet makers, carpenters, builders and all wood workers who desire a machine of large capacity which will do close and accurate work.

It has an adjustable tension, has twenty-four inches swing, and will cut with precision up to three inches thick. It is arranged to use regularly eight-inch saw blades, but can be adjusted to use five-inch blades for very light work. It has an iron tilting table, 18 inches in diameter, turned true and polished, which can be changed to any angle for sawing inlaid work, and an adjustable upright drilling attachment, provided with an "Empire" drill chuck which will hold from No. 60 to 3-16 inch twist drills. It has a large dust blower, which keeps the lines of the work free from sawdust. The driving wheel is heavy, 24 inches in diameter, and the driving belt is of V shape. The height of the machine from floor to top of table is 40 inches, and its weight is 230 pounds.

It is manufactured by the Seneca Falls Manufacturing Company, Seneca Falls, N. Y.

Embellishments of Suburban Station Grounds.

Many of our suburban station grounds offer some convenient spots in which clumps of ornamental trees and shrubs might be grown, without in any way interfering with the movement of traffic or obstructing the full view of tracks, trains and signals.

Such embellishments of station grounds would add greatly to their appearance, and aid in making them attractive.

First impressions are apt to be the most lasting, and many a traveler entering a city receives through the presence of unpleasant surroundings impressions which are likely to be remembered to its prejudice, and which could be in large measure avoided by a little judicious landscape gardening.

In view of the large number of people who will visit Chicago during the world's fair, this suggestion is especially important to the roads entering that city.

The cost of such embellishments would be proportionately small, and in fact nearly nominal in many cases, as nearly all the work can be done by the station and section force at times when otherwise they would be unemployed.

In a few hours section foremen can be so instructed that they will be perfectly competent to conduct the operations connected with the preparation of the ground, the planting and the care and maintenance of the stock.

The selection of trees and shrubs should be made with due reference to the requirements of the station service. Tall and rapid-growing trees should be selected only for spots where such are advisable. The quality of trees to be set out is far more important than their size. Young, vigorous nursery-grown stock, though apparently small, but sure to grow, is far more valuable than long pole-like stock, often dug up from densely shaded positions. Planting in artistically arranged groups or clumps can on general principles be recommended as the most expedient way to secure immediate sylvan effects. This plan is far preferable to the usual mode of planting single trees promiscuously around among grass and weeds, always ready to be set on fire by flying sparks.

A few beds of foliage and bright flowering plants in secure positions are well worth the small expense that they entail, and can be easily provided. The preliminary work of lying out the grounds, etc, should be done by a person accustomed to extensive planting operations and who is well acquainted with the nursery trade.

In most cities such persons can be obtained, and a small outlay incurred in this direction will be money wisely spent.—*Railway Review.*

Repeated Building from the Same Plans.

I prepared plans and elevations (no specifications) of a dwelling for a gentleman, at a stated price. I have just discovered that three houses have been built, and he refuses to pay for using the plans on the last two. On corner of plan was written, Return to —— ——, architect. Can I collect for use of plans for the last two houses? ——

[You have no claim for compensation. An architect prepares plans for a client and sells the plans to the latter to use as he pleases. Whether or not the owner shall duplicate the building is a mere matter of personal courtesy. If the architect desires to prevent the owner from duplicating the building, there must be a special stipulation to that effect in the original contract between them.—*Amer. Architect.*]



INTERIOR FITTED WITH SLIDING BLINDS AND SCREENS AND VENETIAN BLINDS.

THE STANLEY RULE AND LEVEL COMPANY, of New Britain, Conn., manufacture a special tool, called "Stanley's Odd Jobs," which has found great favor with mechanics and amateurs, 15,000 having already been sold. The manufacturers now offer to send sample of this tool by mail, postpaid.

Mortar Colors for Builders.

Messrs. Toch Bros., of New York City, have established a well earned reputation for their unfadable mortar colors, which they now make in almost any desired shade, and of which they are selling enormous quantities.

With binding mortar these colors cement the particles together, combining therewith so as not to run, although it is essential that fronts should be washed down with diluted aqua fortis, so that the incrustations which form on the joints disappear. Prominent builders, such as David King, Jr., Marc Eidlitz, Isaac A. Hopper & Co., and J. & L. Weber, have been using these mortars, and in buildings of no less prominence than the new Music Hall, Madison Square Garden, the Judge building, and the 22d Regiment Armory, in New York City, these mortar colors have been used.

Ten different shades are now made, including blue, which has heretofore been considered an impossibility. The name "Edinburgh," which applies to all the mortar colors of this make, has been trademarked and registered.

Higgins' American Drawing Ink, of which G. S. Woolman, of New York, is the sole agent, has now come into such large use as to be generally known as the American India ink. It is a liquid ink which has extensively displaced the stick ink, and will not become gelatinous or thick. It is put up in a special bottle, with a quill for filling the pen running through the stopper, whereby the fingers may be kept clean and the ink entirely used up. Mr. Woolman also furnishes a special line of blue process paper, and almost every description of drawing instruments and materials, an illustrated and priced catalogue of which will be sent upon application.

Builders' Ornamental Iron Work.

Messrs. J. E. Bolles & Co., Detroit, Mich., are building a large factory to accommodate their increasing trade, which now extends to not only all portions of the United States, but several foreign countries. Their new plant covers a little over an acre of ground, and is fitted up with first class machinery. They are now filling a large order of ornamental railing for the new Tampa Bay Hotel, at Tampa, Fla. Architects and builders requiring anything in the line of wrought or cast iron work for buildings, artistic grill work, brass or metal work, will do well to correspond with this firm.

Hot Water Heating.—The Detroit Heating and Lighting Co., manufacturers of the Bolton Hot Water Heater and the Combination Gas Engine, have just concluded a large contract for the heating of St. Anthony's Hospital of the Sisters of the Poor, at Columbus, Ohio, which will require about 15,000 feet of radiating surface.

IMPROVED SPRING HINGES.

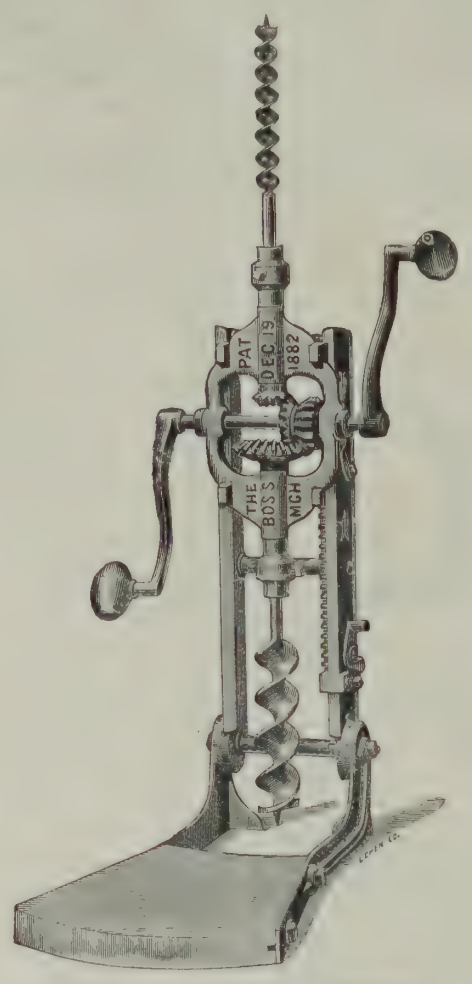
The hinges shown in the accompanying illustration are easily put on, and, when once on, do not get out of order, and also work easily. They are made in brass, bronze, copper-bronzed, Bower-Barffed, and japanned, by the Van Wagoner & Williams Co., who also make other kinds and styles of spring hinges, including the American, the strongest and best spring hinge for heavy doors on office and public buildings; also, the Oxford and Star. They also make a variety of spring hinges, for screen doors, etc. A catalogue of their specialties may be had on application. Address Van Wagoner & Williams Co., 82 Beekman Street, New York.



THE "GEM" SPRING HINGE.

AN IMPROVED TWO-SPEED BORING MACHINE.

The illustration represents a machine which will especially commend itself to carpenters, and with which the operator can successfully run a large and a small auger. The machine reduces the speed of the large auger and increases that of the small one, thus properly equalizing the power required to do the work. The auger will cease to bore at any required depth, clear the chips from the hole, bore at any angle, fold up compactly for placing in tool chest. There are no springs or shifting gear to get out of order, and everything is firm and solid. This machine is manufactured by Messrs. J. H. Osborne & Co., Union City, Ind.



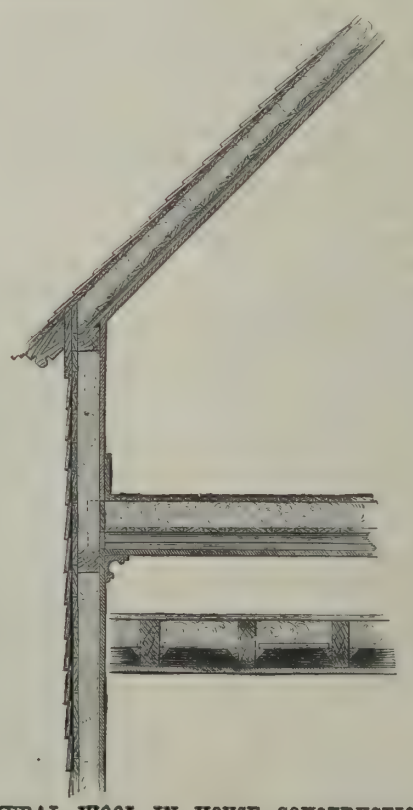
THE "BOSS" BORING MACHINE.

Oil and Wax in Painting.

Among the ancients, wax was the principal vehicle for pigments, and the advantages attending its use have not, perhaps, in our time been sufficiently appreciated. Its preservative effect, both upon the canvas and the mass of coloring material in a painting, is its great recommendation; and it is found that this effect is continued when the proportion of wax employed is but small. Oil, and more especially drying oil, has a contrary effect, and its affinity for oxygen tends both to the destruction of the canvas and to promote chemical action among the pigments, unless some protective agency is employed. Hemp which has been imbued in oil has even been known spontaneously to burst into flames, and this fact is a sufficient proof of the energetic action which takes place when vegetable substances are left at a certain temperature in contact with fatty bodies. Many pigments which cannot, on account of their changeable or fugitive nature, be employed simply as oil colors, may safely be used under the preservative influence of wax. Thus chrome yellow, verdigris, orpiment, gamboge and the lakes, together with the metallic oxides, which are changeable in oils, may readily be made available to the painter, and subservient to the interests of art. Indeed, in every portion of a painting, wax appears to have its sphere of utility. Added in small quantity to mastic and other varnishes, it prevents the cracking which is consequent upon their contraction and the loss of their tenacious elasticity in drying; and, again, the advantage it affords of preserving the back of the canvas from the influence of moisture might well be profited by. We are told that Titian painted on a red ground, and imbued his canvas at the back with beeswax dissolved in oil. Wax, which is distinct in its properties and reactions from the fatty bodies in general, has been described by Thomson as a kind of deoxidized oil. It is the purest and most unalterable of all unctuous bodies. Speaking of the wax encaustic painting of ships among the Greeks, Pliny observes, "Quæ pictura in navibus nec sole, nec sale, ventisque corrumpitur." When bleached it melts at 158° Fah., and congeals at 149° Fah. Hot oils, both volatile and fixed, readily dissolve it. It is not changed by exposure to the atmosphere, and is scarcely acted upon by the strongest acids. The fluid portion of oil, or oleine, is a compound of oleic acid with the oxide of glyceryle and the solid portion, or stearine, of stearic acid in combination with the same base. When for this base we substitute an alkali, such as potash or soda, soap is produced, and the fat acids may also be made to combine with various oxides, forming plasters or metallic soaps. The oxide of lead, for instance, when boiled with olive oil, forms diachylon plaster, or, if but a small quantity be used, the oil acquires peculiar drying qualities. It was in profiting by this circumstance that quickly drying oils were first produced for the purposes of art. Besides the oxides of lead, the acetate of the same metal, the sulphate of zinc, and latterly the protoborate of manganese, have been found available for the purpose of communicating a drying quality to oil. The explanation of this appears to be that the oxide of glyceryle is sufficient to hold in combination the acid of these salts, and that a double decomposition occurs which is of sufficient permanence for the object in view, namely, the speedy desiccation of the oil, an effect which depends upon the combination of the metallic oxide. If, however, as is remarked by Field, we use the oil rendered drying by the sulphate of zinc, together with that which owes its drying qualities to the acetate of lead, we obtain by double decomposition two new compounds, the acetate of zinc, which is an ill drier, and the sulphate of lead, which is insoluble and opaque; the oil is also restored to its original condition. The fact of this chemical barbarism being recommended in various works upon art is an instance of the necessity of scientific guidance in the manipulation of the various materials of the painter's art. When exposed to the air, the fixed oils become yellow, viscid and rancid, and also acquire an acid reaction. They then absorb oxygen from several pigments, as in the case of red lead, which often blackens in oil; but, according to Montabert, this is prevented by the addition of resins or wax.—*D. G. Fitzgerald.*

MINERAL WOOL IN HOUSE CONSTRUCTION.

Architects, builders, carpenters, and all owners of their own houses, who have not looked into the merits and economy of mineral wool as a house lining, have failed to come up to the opportunities afforded by one of the most valuable improvements brought out in recent years. Mineral wool is simply blast furnace slag, which, when in a liquid condition, is blown by a powerful blast into a fibrous state, the fibers then resembling those of fine wool and cotton. The change is so great as to be simply marvelous, until one becomes familiar with the actual facts, when it is found that the product, like finely spun glass, contains 92 to 97 per cent. of its volume of air. It is then comparatively inexpensive, but forms a most efficient insulator of heat and protector against cold, and a preventer of the spread of fire and deadener of sound, while it obstructs all harboring of rats, mice and insects. The application of this substance as a filling in the hollow wall and empty floor space of a building is shown in the accompanying illustration. By its use in the ground floor, protection is afforded against the dampness of the cellar. Using it in the studding in the outside walls, from foundation to peak, and in the roof, it prevents the extraction of warmth from the interior, and reduces the consumption of fuel in cold weather, while rendering the temperature more equable in all seasons.



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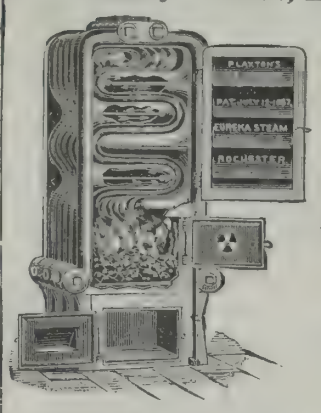
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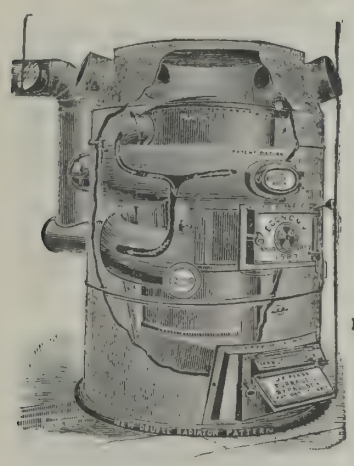
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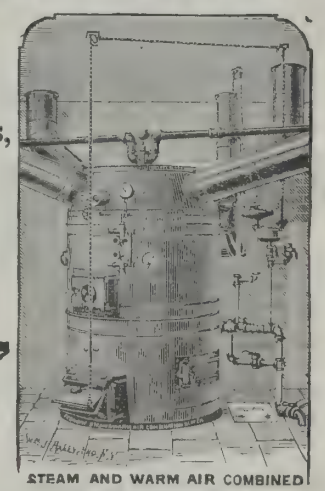
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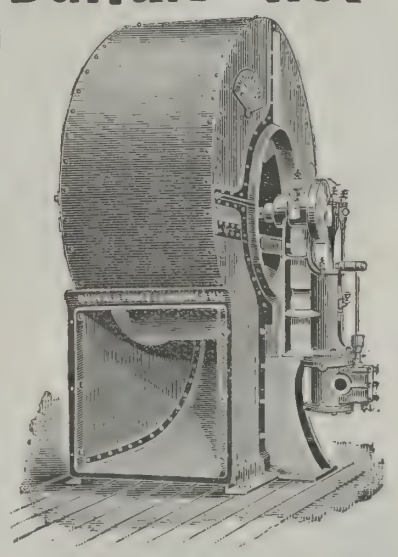
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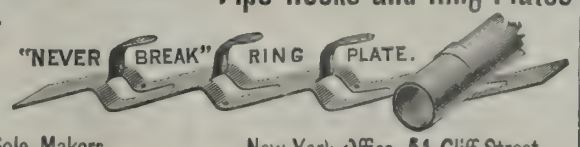
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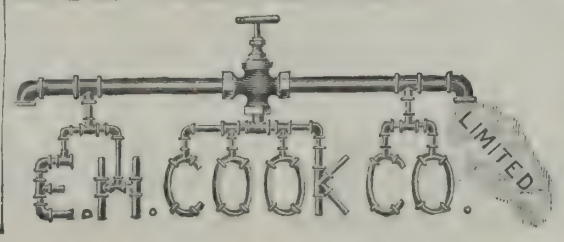
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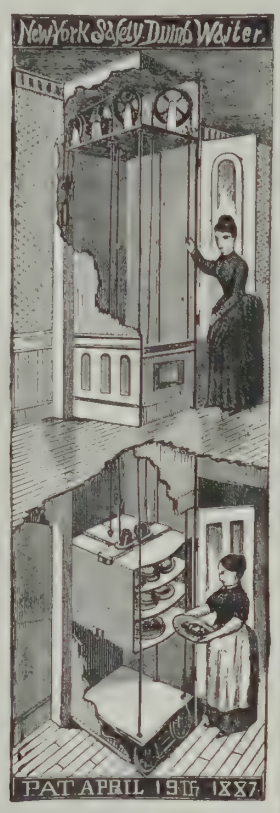
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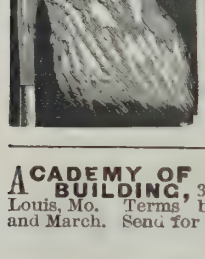
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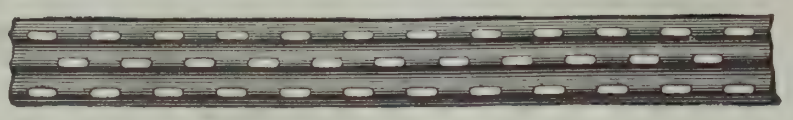
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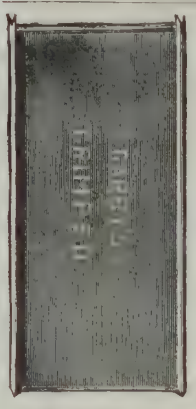


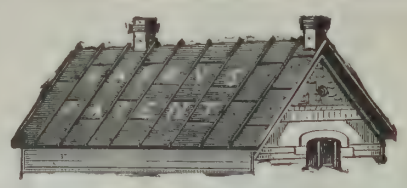
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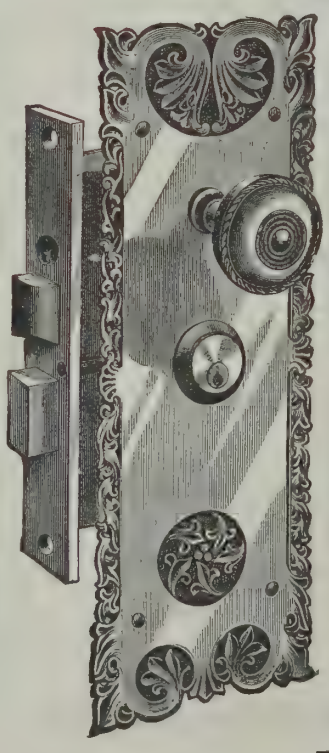
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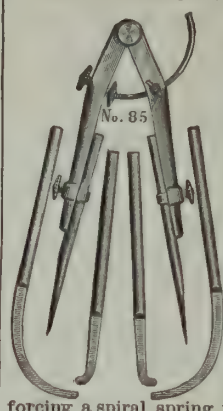
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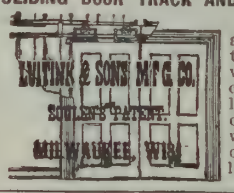
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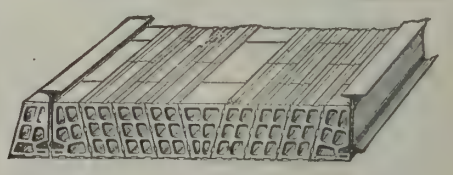
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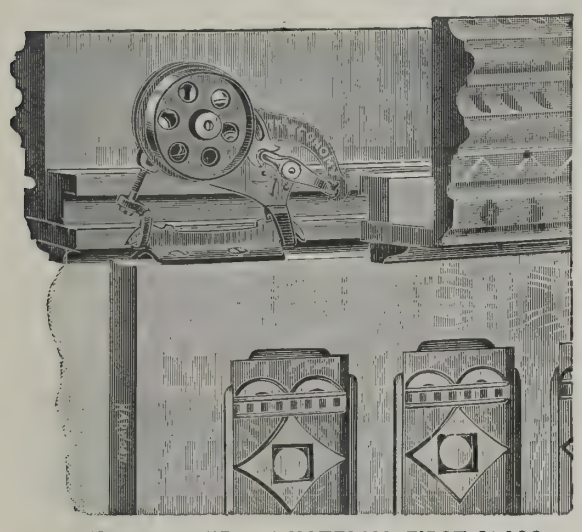


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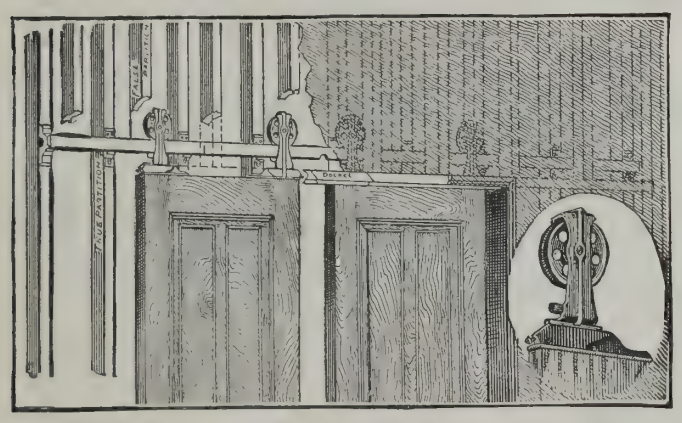
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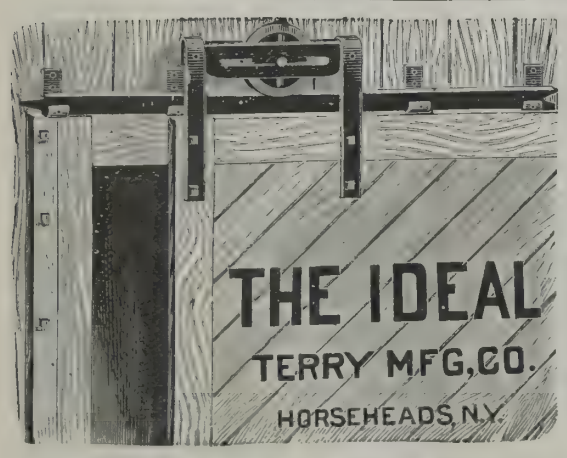
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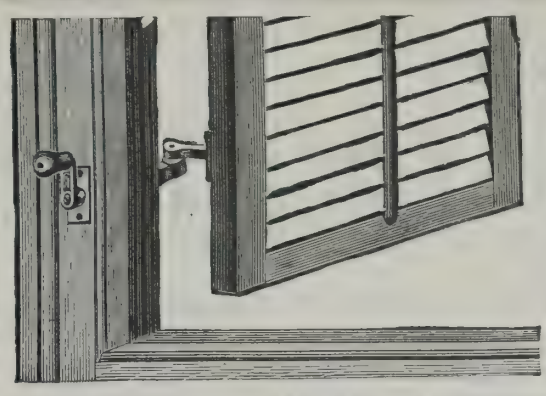


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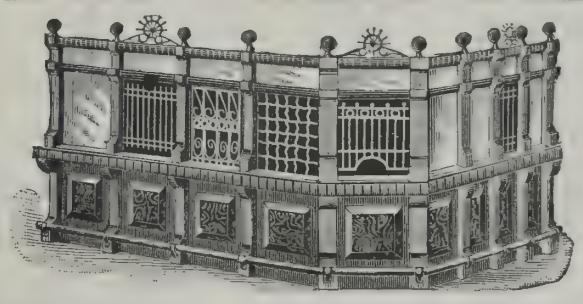
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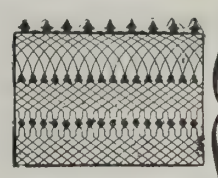


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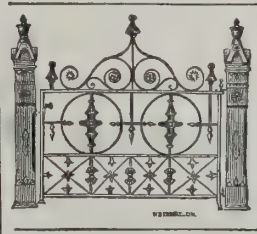
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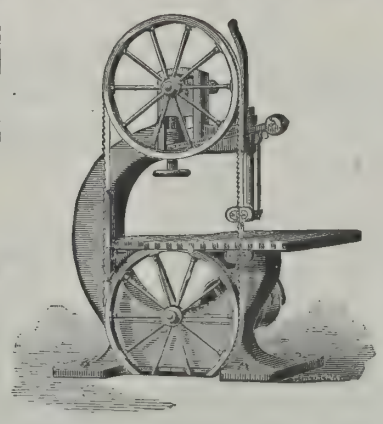
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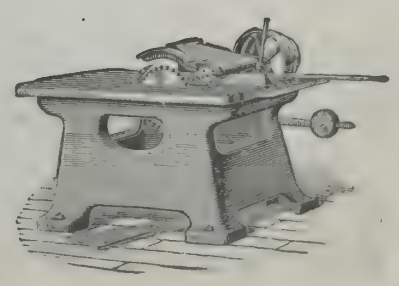
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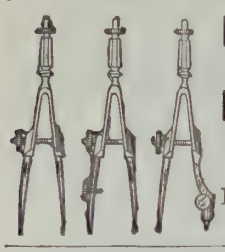
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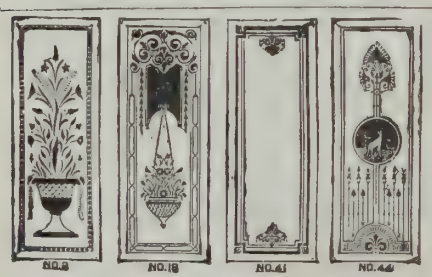


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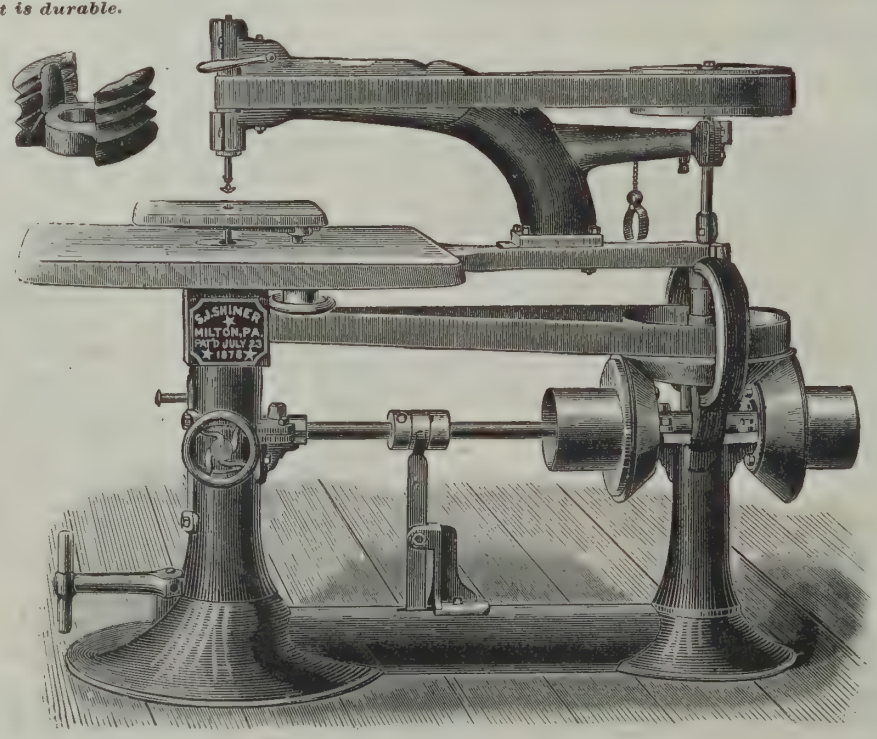
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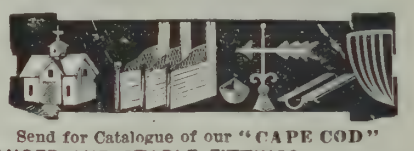
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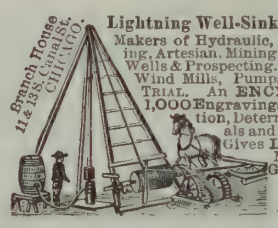
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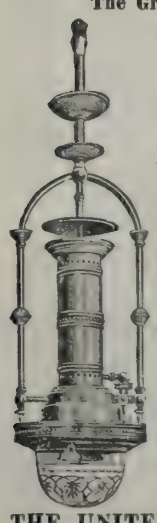
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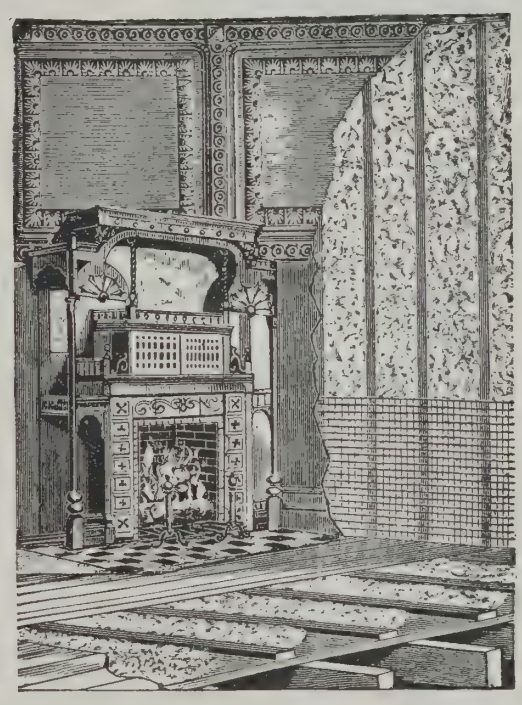
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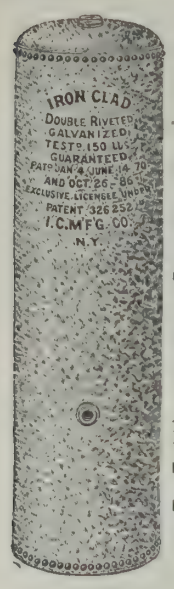
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(1) D. B. A. says: Some years ago a dam was built across a river here, and a short time since began leaking badly. Upon examination it was found cheaper to build a new dam than to repair the old one, consequently a new one was built, but a little further down the stream, and the water filling in soon became level on both sides of the old dam. Now a discussion has arisen as to which dam supports the pressure of weight of water in the lake above. One party contends that the old dam has still the same pressure upon it as formerly, while the other party claim that the new dam has now the whole pressure of the lake against it. A. The new dam supports the whole pressure of the lake as long as the water covers the old dam, which has the pressure on both sides, and is, in consequence of this balanced pressure, a neutral point. If there was a difference of level in the water above and below the old dam, the pressure would be divided by the hydrostatic difference of level.

(2) F. J. McV. asks: Will you please inform me what kind of a paste or cement I can use to fasten a strip of wood to glass and brass? A. Melt together equal parts of common pitch or Burgundy pitch and gutta percha.

(3) H. B. says: Will you kindly settle an argument that has arisen in one of the machine works in this place? All the men in the room save myself say that the gibs on a planer head do not hold it from dropping. One man says that he cannot do a fine job on a planer that has any lost motion in the screw, says that the head will drop and cause the tool to dig in. I say that I can take the rejected planer or any other and do any ordinary job in first class shape with the down feed screw taken out of the planer. A. We have done some very good work on a rickety planer, which does not waive our admiration for a perfect tool. What your shopmates say they cannot do may be true, and what you say you can do may be also as true. There is much in knowing how to do good work with poor tools.

(4) J. A. C. writes: 1. I am using water in my house from a boiling spring (cold), and it coats the tea kettle with a deposit of lime or something of that nature, and it is now almost half an inch thick, and I find it difficult to remove. How can I remove it and how keep it from gathering again if possible? A. You can purify it by adding to it some lime water. Determine by experiment how much is needed. This addition will produce a white precipitate and will carry down all the lime. The water must then be allowed to settle and clear. Do it a barrelful at a time. Once you determine the right amount to use per barrel, the principal work is done. 2. Do you consider such water unhealthy for one to drink? A. It is disputed. We incline to the belief that it is not necessarily injurious.

(5) J. F. S. says: I wish to construct an aquarium, size 2½ by 1¼ by 1¼ feet, bottom of wood and corner posts of wood, fastened by iron rods running through center of post and bottom. I wish to know what is best wood to use. How should wood be prepared to prevent leakage or dampness warping and cracking glass? Cement for corners and bottom edge. A. Make the frame of your aquarium sides and bottom of oak, with glass in bottom. Boil the frame before putting together in linseed oil for a few minutes. Make a cement of equal parts of litharge, fine white sand and plaster of Paris. Mix with boiled linseed oil, with a little drying oil, to a stiff putty. Let it stand a few hours before using. A frame bottom with glass is better than a solid wood bottom.

(*Continued on page* ix.)

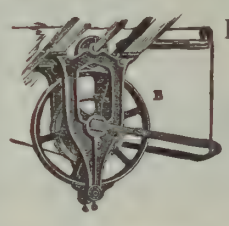
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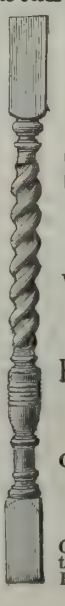
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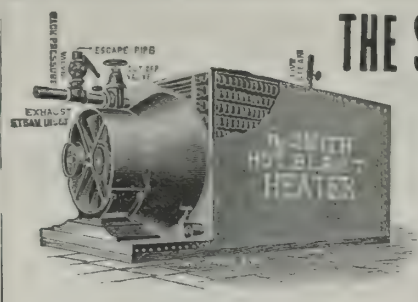
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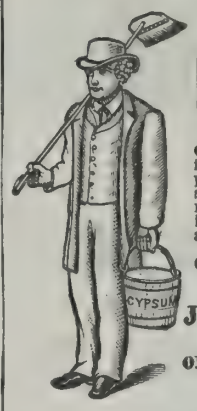
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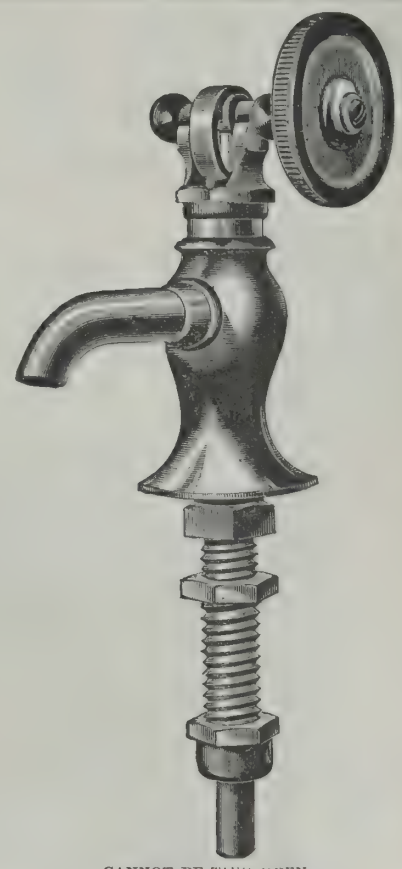
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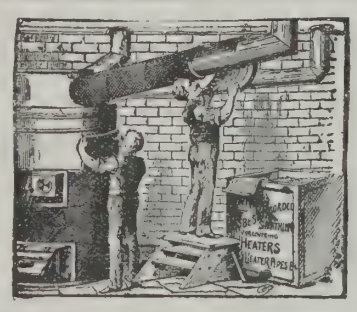


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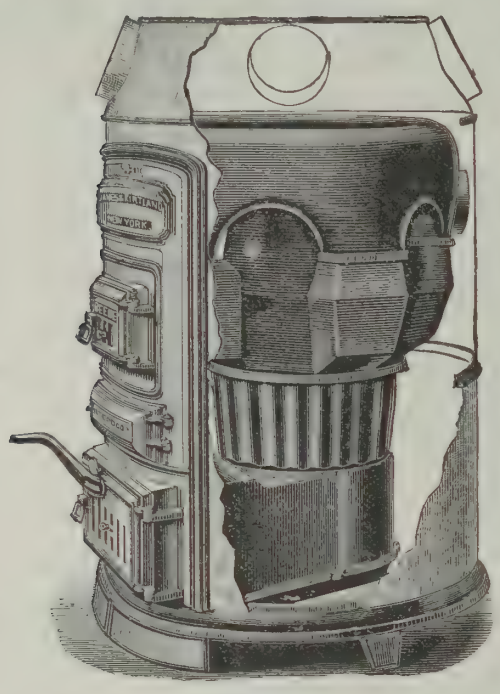
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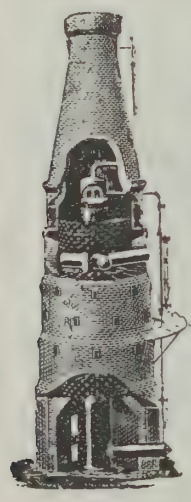
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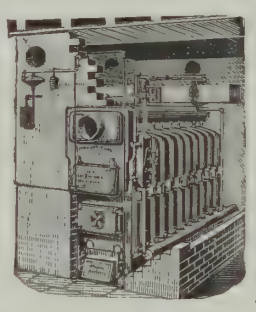
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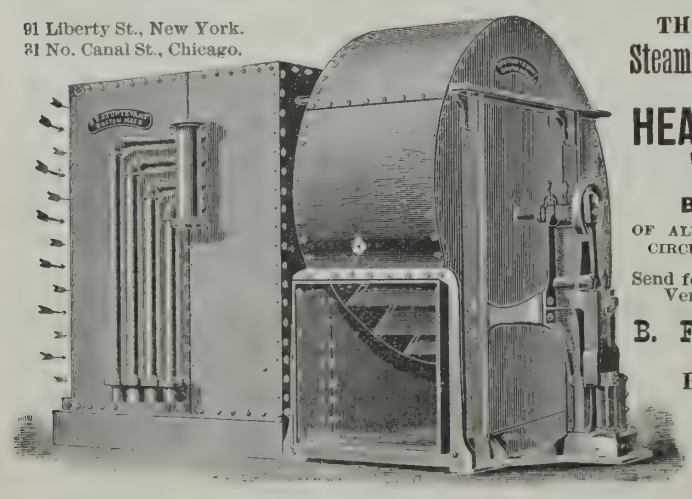
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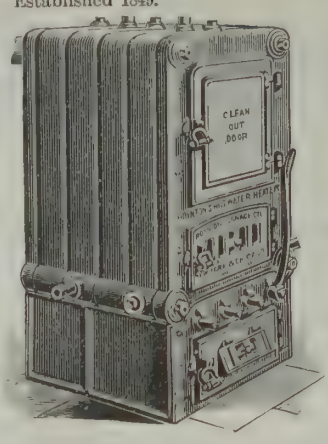
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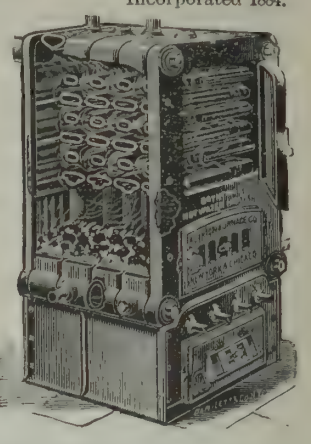
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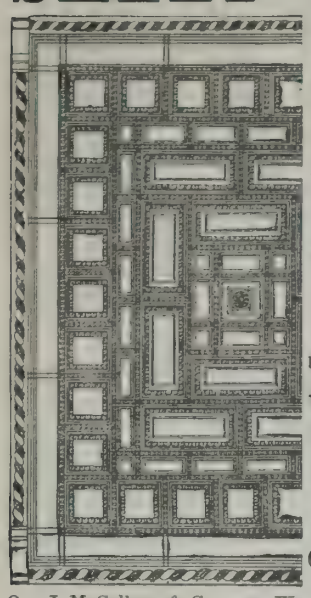
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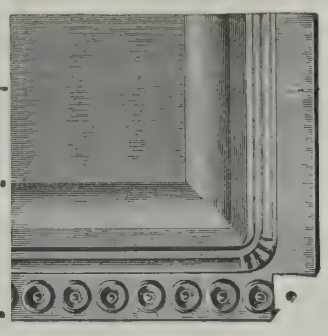
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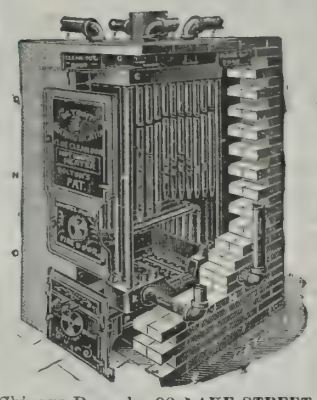
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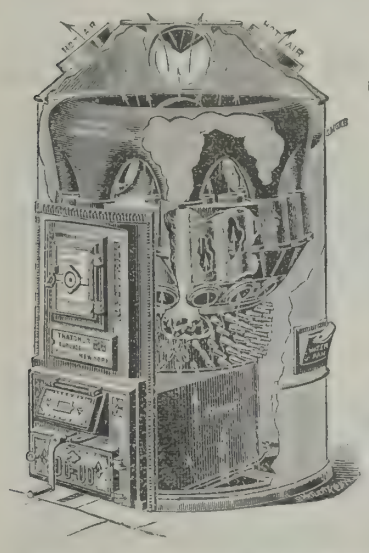


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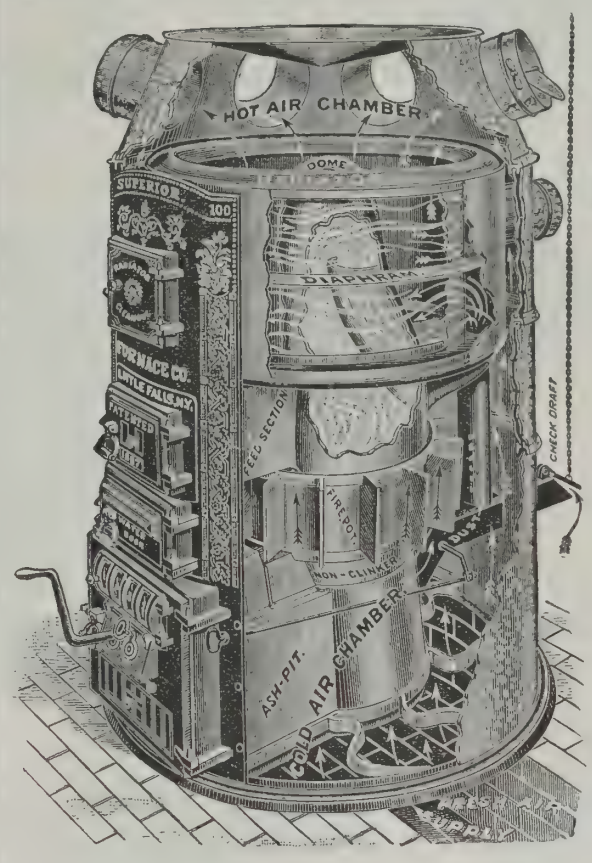
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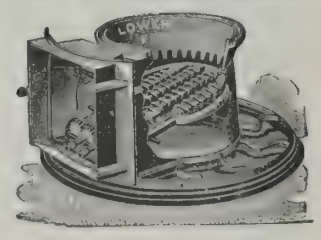
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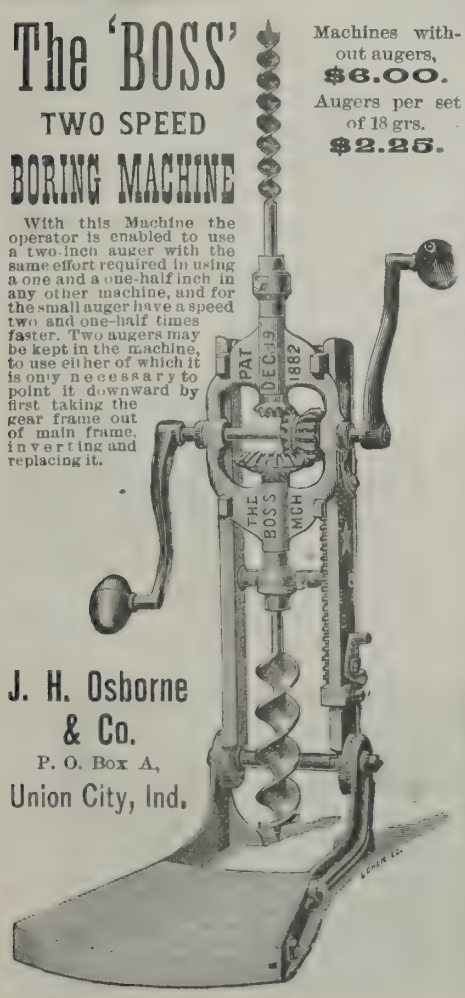
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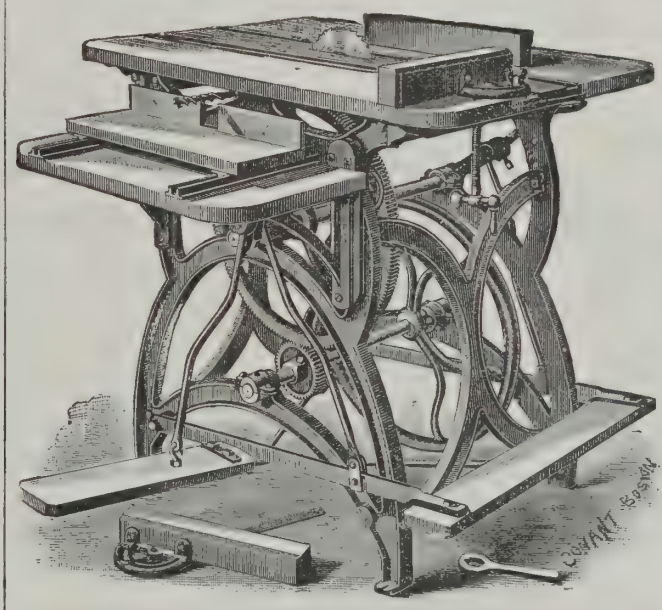
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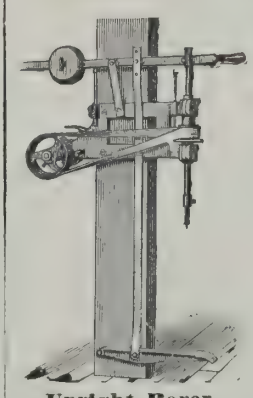
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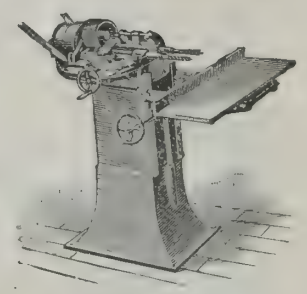
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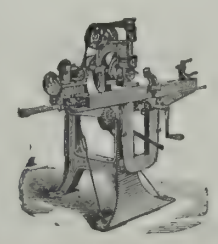
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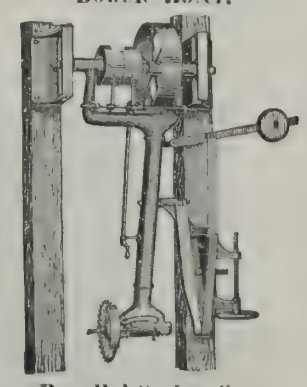
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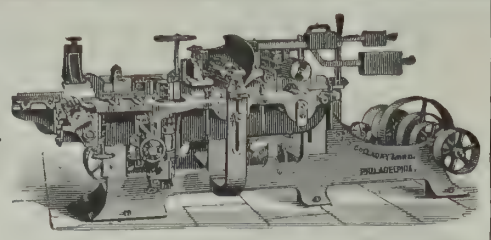
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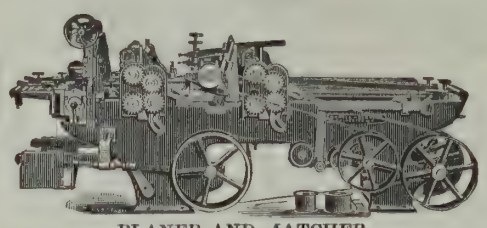


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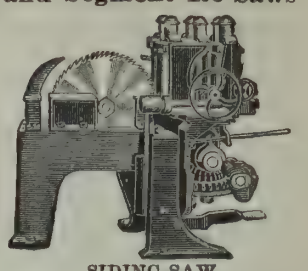
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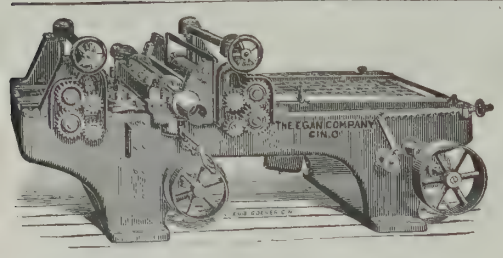


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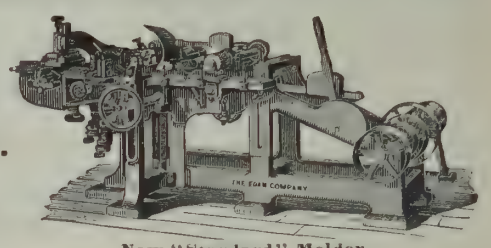
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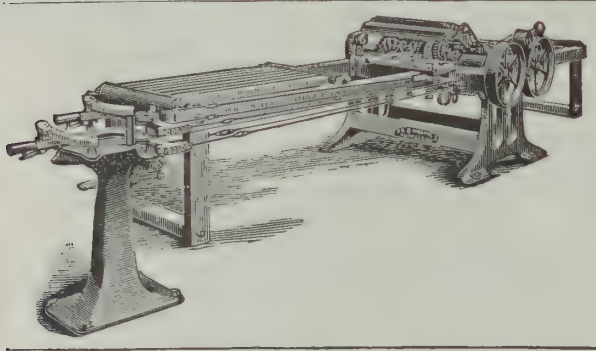
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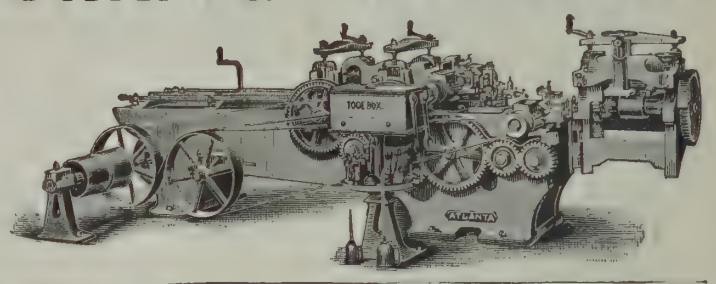
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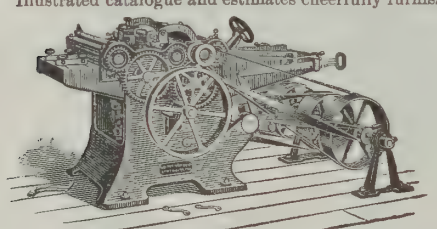


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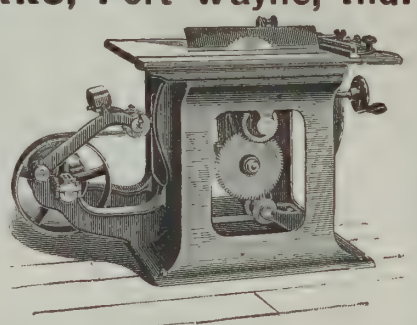
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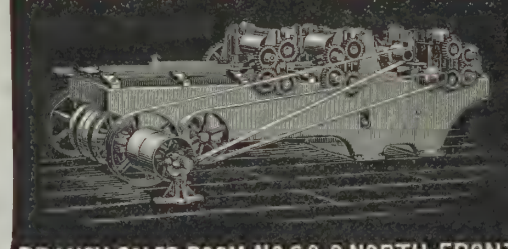
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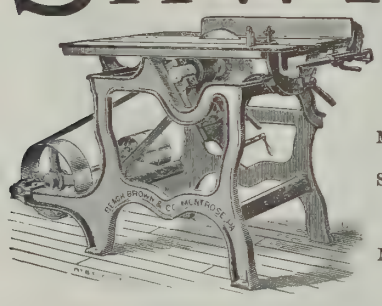


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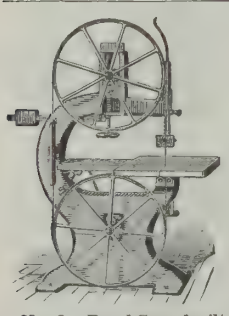
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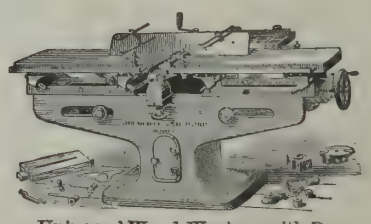
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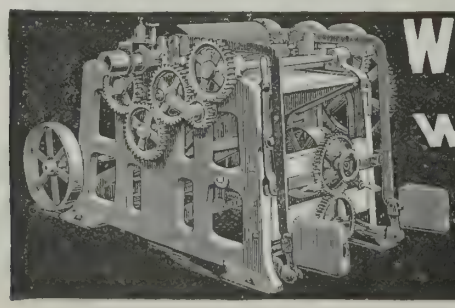


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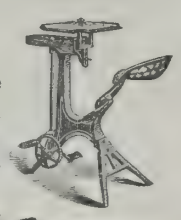


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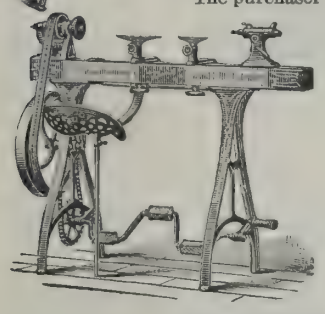
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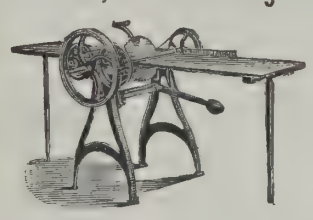
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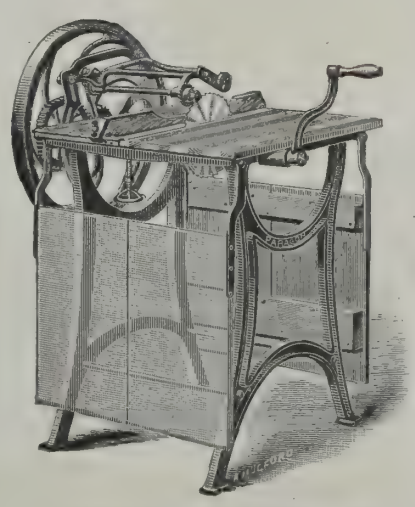


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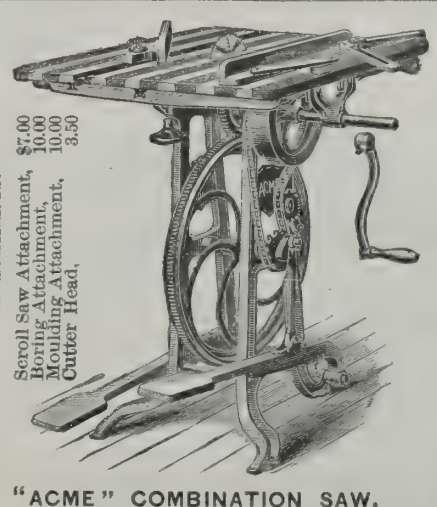
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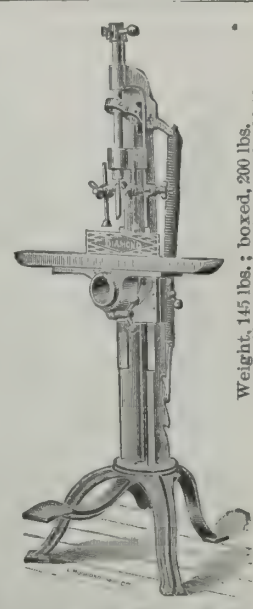
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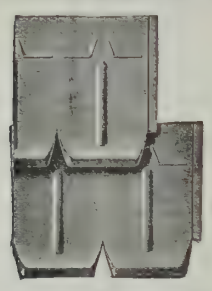
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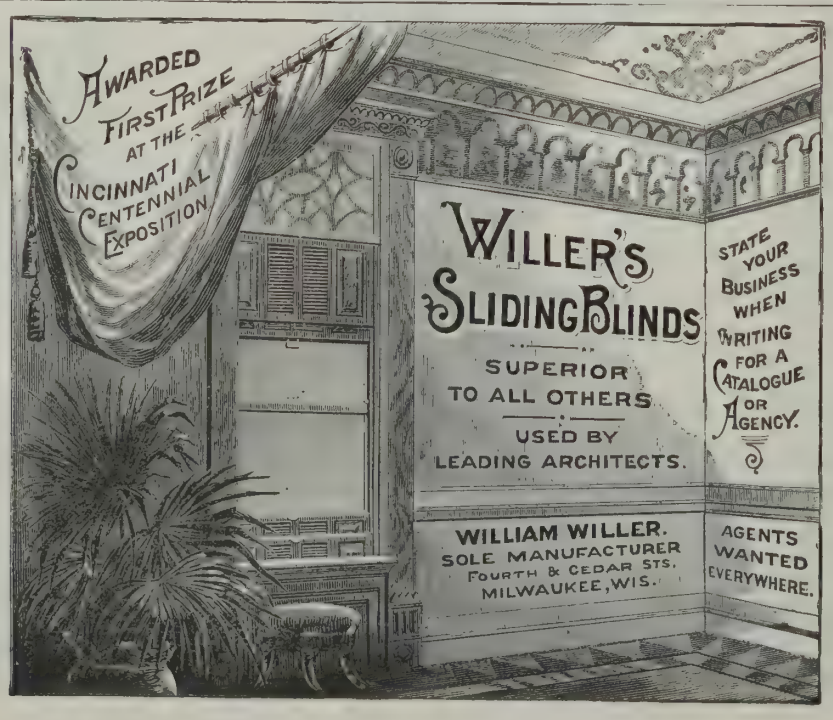
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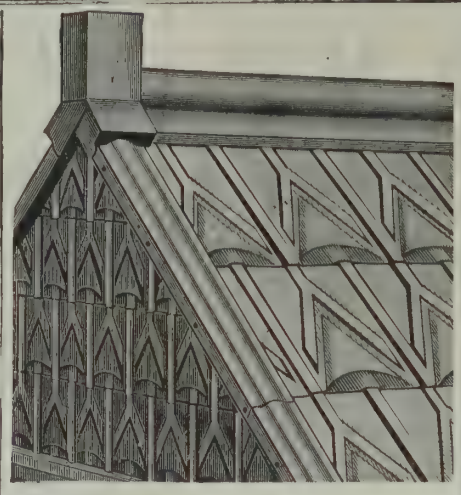
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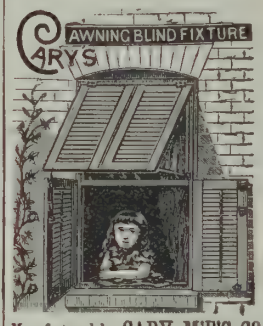
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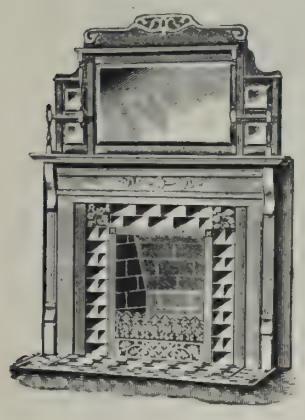
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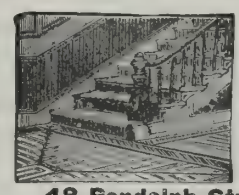
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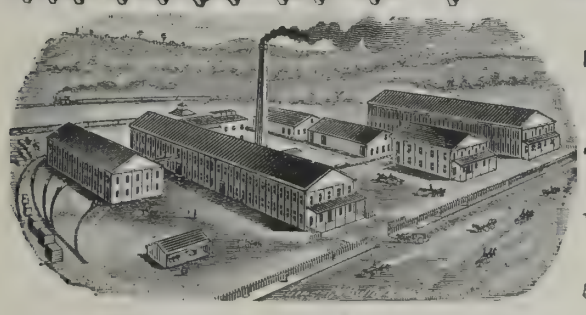
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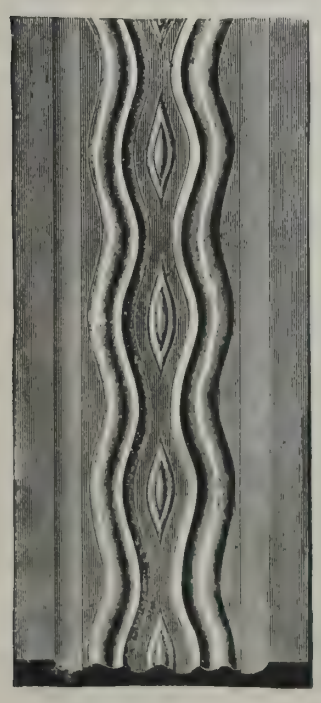
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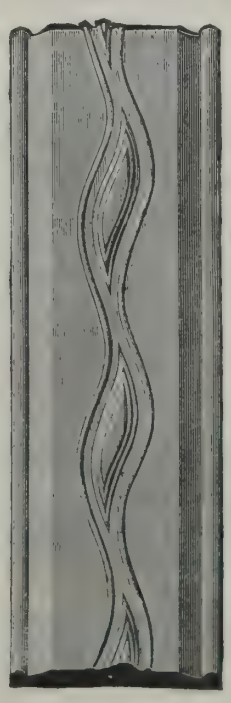
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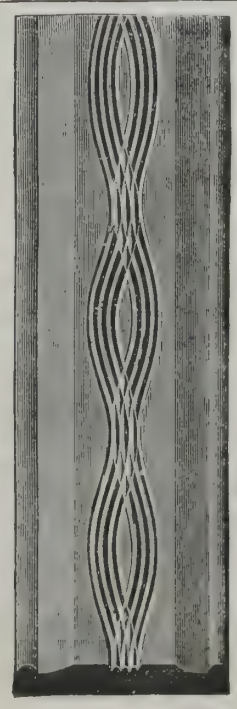


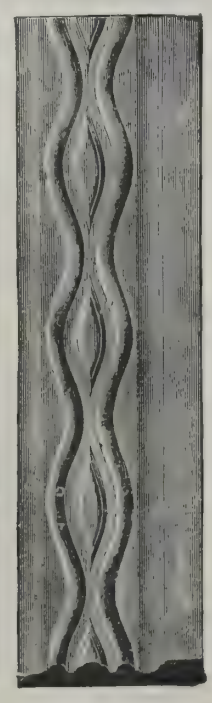
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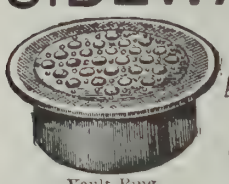
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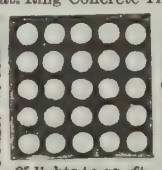


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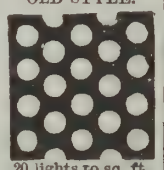


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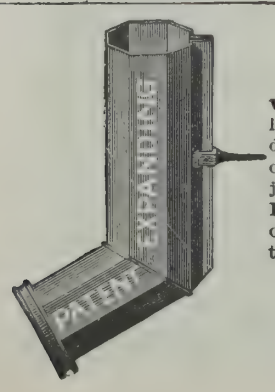
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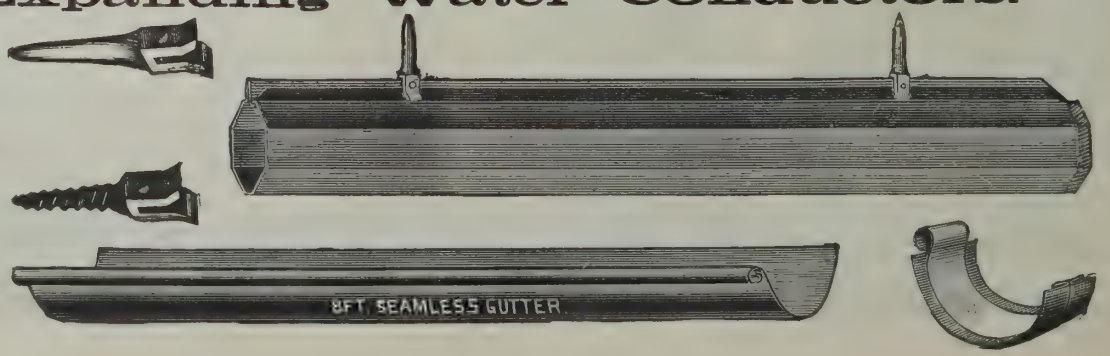
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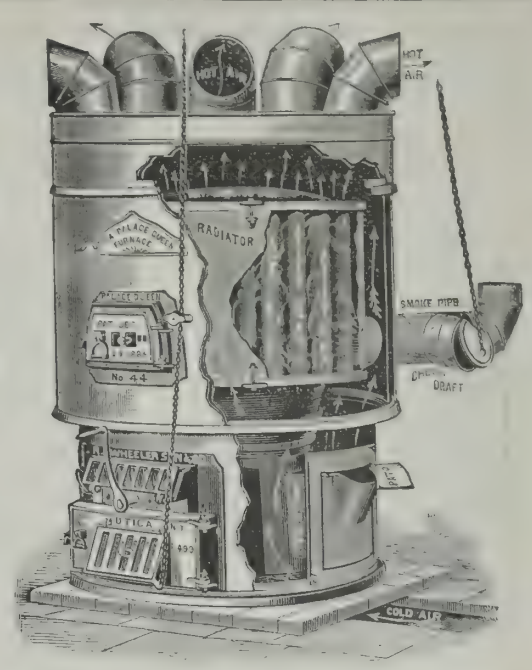


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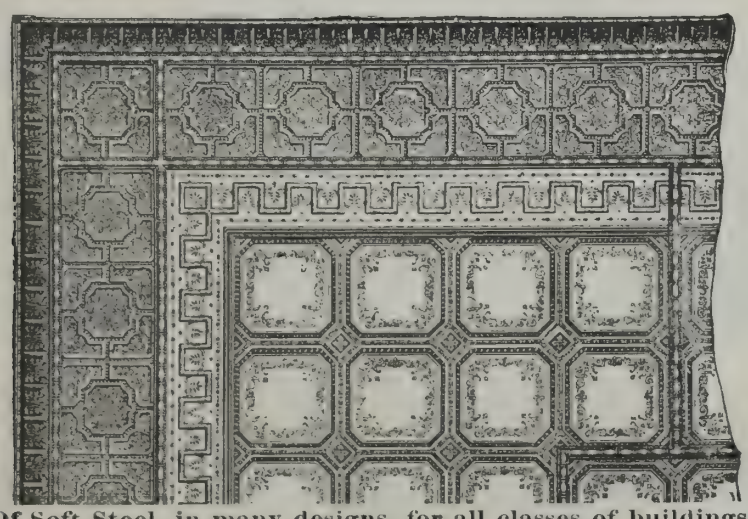
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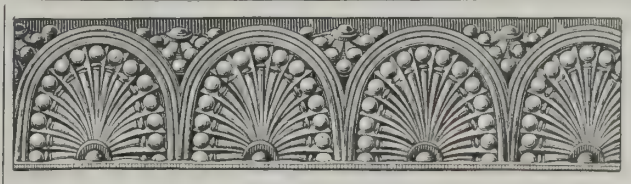
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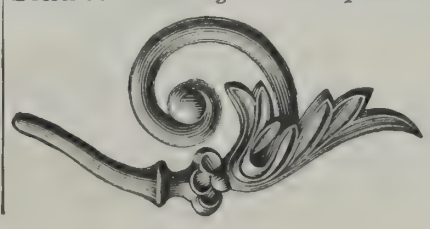
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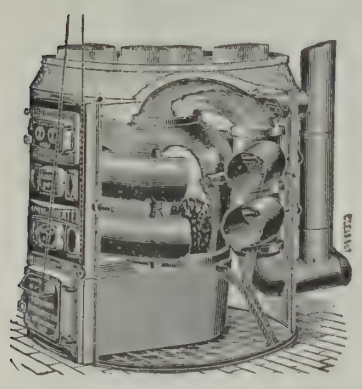
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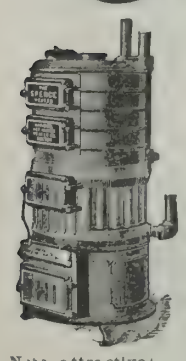
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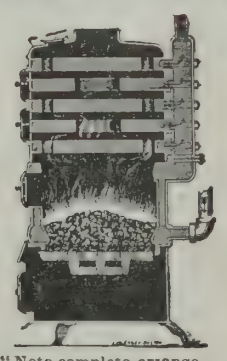
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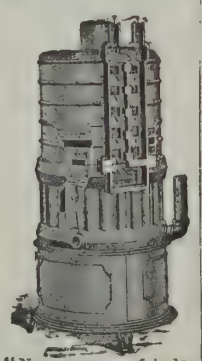
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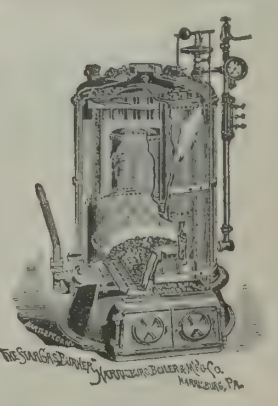
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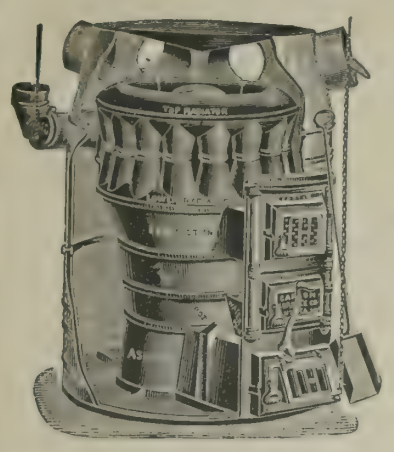
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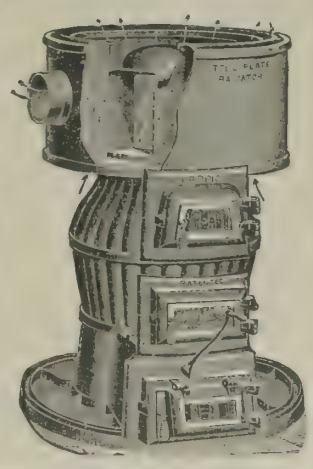
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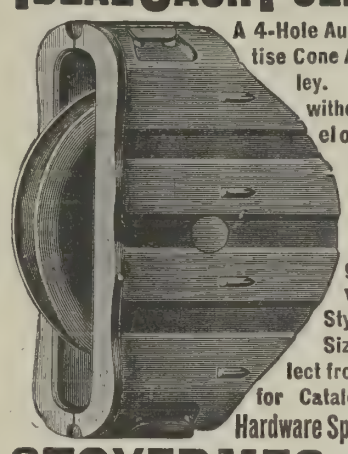
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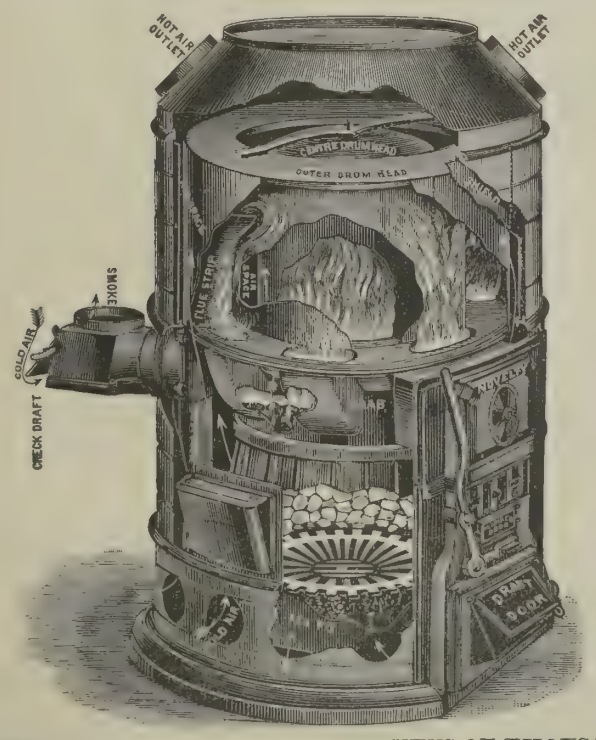


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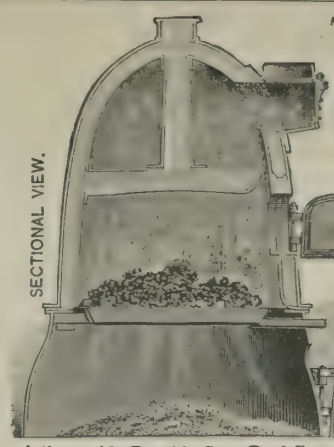
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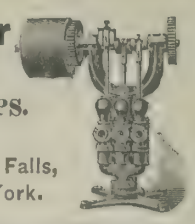
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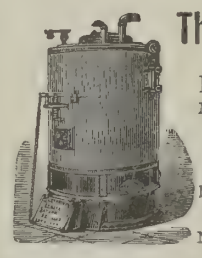
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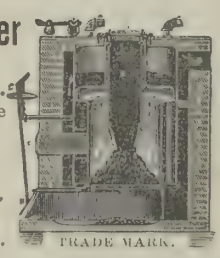
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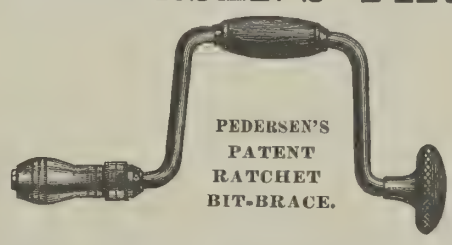
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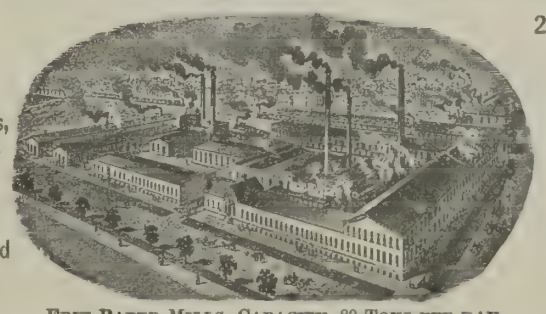
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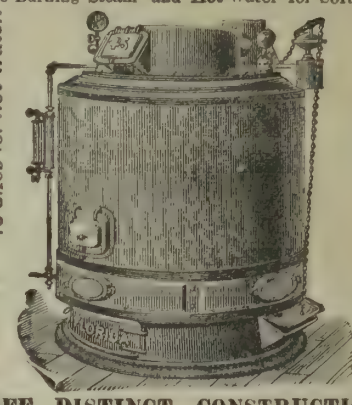
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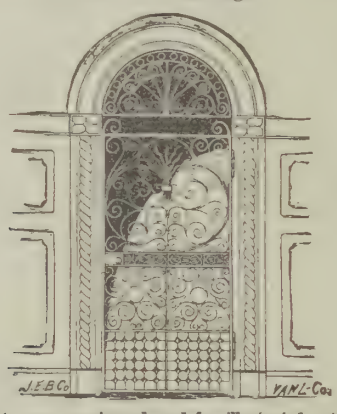
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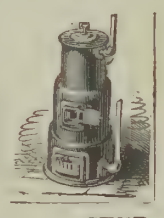
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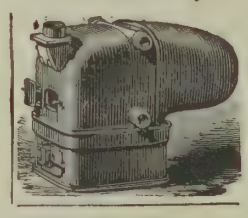
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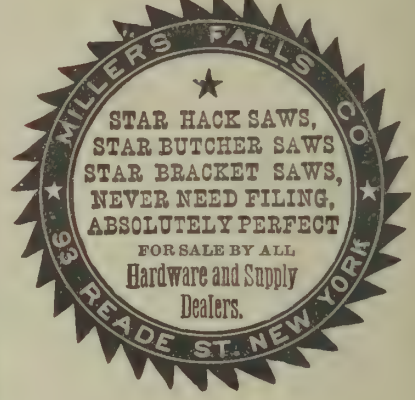


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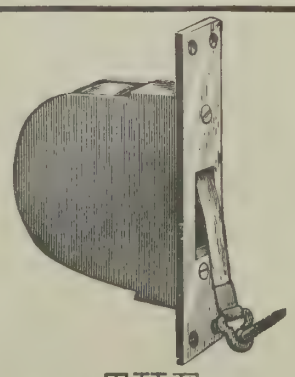
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